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THE IRRIGATION AGE.

VOL. XIII.

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THE PROGRESS OF WESTERN AMERICA.

The National Irrigation Congress. There is nothing that has done more to further the cause of irrigation than the National Irrigation Congress; no more potent factor can be found for bringing the benefits of the system before the public and arousing congress to the need of legislative measures in its behalf than the annual meetings of this body. A few short years ago irrigation was a word seldom heard outside of a few states and the system was considered to belong as exclusively to the state of Utah as did Mormonism. But surely, though slowly, (thanks to the Congress) the knowledge of the benefits of the system is now being spread throughout the country. Recognizing the benefits of the Congress it is with sincere pleasure that the AGE, as an exponent and upholder of the irrigation movement, chronicles the meeting of the seventh annual session of the National Irrigation Congress.

Cheyenne the City.

Cheyenne succeeded in capturing the Congress this year, and on September 1, 2, and 3 those interested in the reclamation and settlement of the arid lands, the preservation of our forests, and the many kindred topics which hinge upon the great principle of irrigation, met a hearty welcome from Cheyenne citizens. The meeting was a success. A very encouraging sign was that every officer of the association was present and that thirty states were represented by delegates, also fraternal delegates were present from the governments of Canada and Mexico. A serious wash-

out on the railroad prevented many from reaching Cheyenne until Saturday—the last day of the convention, too late to participate in any of the discussions.

The Objects of the Congress. The objects of the Irrigation Congress—to formulate plans for reclaiming and settling the arid lands of the West, to arouse the interest of the public in the irrigation movement and to present to Congress the need of government aid in carrying out the plans proposed—is furthered by these annual meetings. The most skillful engineers, the men interested in the economic problems of the country, the farmers, legislators, writers, are all brought together to discuss questions of vital interest to the public. The papers read are an education to those so fortunate as to hear them, and we hope at some future time to present some of them at least to our readers.

Col. Maxon's Report.

An important feature of the recent session was the report of Col. H. B. Maxon, member of the committee appointed by the Lincoln congress to go to Washington. This report, which was given the second day of the convention,—read that the committee had succeeded in framing a bill which secured the support of the House Committee on Arid Lands. This bill provides that states taking advantage of the Carey law shall have ten years from the date of final segregation to reclaim. The state may file through a local land office for temporary segregation for a period of four months. Failure to file maps and plans within this period works a

forfeiture of the effort. Upon final segregation, the desert character of the land will be held to be finally settled. Both Congressman Shaforth and Jenkins waived the right to push their individual bills in support of the committee bill, but since the war with Spain the whole matter has lain in abeyance.

The report received the enthusiastic applause of the Congress and the committee received hearty thanks for the manner in which its duties had been performed.

A Firm Friend. The Congress has one firm friend in the "high places" in Secretary Bliss of the Interior Department. Recognizing the fact that preservation of our forests is dependant in a great measure upon irrigation, he is a staunch upholder of the latter cause and President Carey, as well as the members of Congress realize how much they are indebted to him for the good work he has done in their behalf.

Resolutions Adopted. The resolutions proposed by Geo. H. Maxwell, of California, which were embraced in his article "Annex Arid America," appearing in the September number of the AGE, were adopted by the Congress. These comprise the resolutions of the Phoenix Irrigation Congress—"Arid Land Reclamation" and "Conditional State Cession;" resolution of the Lincoln Congress, "United Ownership of Land and Water;" the endorsement of the Chittenden report on Federal storage reservoirs and the endorsement of recommendation of Elwood Mead as to the leasing of the grazing lands.

Officers Elected. The Congress showed its appreciation of President Carey's work in the past by re-electing him president of the body for the coming year. The other officers elected were: Dr. S. B. Young, first vice-president; S. A. Cochran, South Dakota, second vice-president; S. M. Knox, Illinois, third vice-president; O. E. Cutcheon, Michigan, national lecturer; G. H. Maxwell, California, assistant national lecturer; Frank Bond, Wyoming, press clerk.

The Next Annual Session. R. M. Tansill, of Eddy, New Mexico, made a strong and witty plea for Eddy, as the place for the next session of the Irrigation

Congress, claiming that an irrigation convention should meet where its members might see irrigation in practical operation, and that Eddy, in the Pecos Valley, New Mexico, would afford such an opportunity. As New Mexico had entertained the convention but a few years ago, Mr. Tansill's plea was disregarded and Montana selected as the state in which to hold the eighth annual session, the city to be decided upon by the executive committee. This committee will consist of the following men for the ensuing year: H. L. Kellogg, Colorado; S. M. Knox, Illinois; J. H. Churchill, Kansas; R. W. Silvester, Maryland; Thomas Knight, Missouri; J. D. O'Donnell, Montana; M. M. McCutcheon, Michigan; T. G. Frost, Minnesota; M. Dougherty, Nebraska; H. B. Maxson, Nevada; S. N. Smith, South Dakota; H. McClinck, Arizona; Judge Shurtliff, Utah.

Who has Broad Shoulders? The war with Spain is over, but there is still quite a little "fight" going on between the commanders and the department heads, and an effort is being made to place the blame for the gross mismanagement of the recent campaign where it justly belongs. That there was mismanagement and mistakes that amount to almost criminal carelessness, is generally conceded, but it is not definitely known whether one man or many will have to shoulder the burden of public disfavor. That there were too many "tin soldiers" put in as officers on account of political pulls and that incompetency, which cost many a poor private his life, was the result, none can dispute, and the essayist who tied his article on the "Late War" with red tape instead of blue ribbon, knew what was appropriate to the occasion.

There are thousands of people who sympathize most heartily with the sentiments of Rev. N. Couden, of Michigan, the blind chaplain of the House of Representatives, "In my judgment," said he, "this whole trouble in our camps and army has arisen out of the incompetency of many of the officers; not that they did not want to help their men, but because they did not know how to do it. One great trouble I think has come from taking too many officers out of the various militia organizations and putting them on the same footing as

regulars. They are theoretical officers and when they come to put their theories into practice they failed abominably."

Farther on he makes the statement to which every loyal American will respond "Amen": "It is simply criminal for an officer to allow his men to go hungry when he is within reach of rations. Red tape or no red tape, the American soldier should not go without food: If I were a commanding officer I would break open cars if necessary to obtain the provisions with which to feed my men."

Secretary Alger has been severely censured by the press, whether altogether deservedly or not we leave for the investigating committee to determine, but his friends in Ohio are loyal and will not hear him blamed. An amusing incident occurred during the G. A. R. convention at Cincinnati, which recalls the old story of Patrick Henry, who in speaking of tyrants mentioned the name of George III, when a voice interrupted with the cry of "Treason!" "And Geo. III may profit by their example. If that be treason make the most of it!" concluded the witty Irishman. Gov. Pingree, of Michigan, in a speech at the G. A. R. camp fire, Sept 7, was quite vehement in his criticism of the management of the Spanish-American war, and after citing several instances of bad management said: "If Secretary Alger—" he could go no further. The friends of Alger, thinking some disparaging allusion was about to be made concerning him, hissed and hooted Gov. Pingree until he was compelled to withdraw. After quiet had been restored the chairman finished the sentence, which the audience would not suffer the Governor to finish, reading as follows:—"If Secretary Alger had been given full power, such things would never have happened." And with the audience who hissed it was a case of being "sorry that they spoke."

A New Departure. In the November issue the IRRIGATION AGE will give the first instalment of a series of articles on the banking methods of our own and foreign countries. This does not come strictly within the sphere of this journal, but it is a matter of such vital importance to every person—no matter in what section of the country he resides or

what his occupation may be—that we feel justified in devoting space to the subject, upon which too many are grossly ignorant. Besides being instructive, these articles will be very interesting, tracing the banking system from its inception, years before the Christian era, to the present time, with the attendant evils.

The author, Mr. Geo. J. E. Mayer, has given a great deal of time and study to this subject and as a result of his labor is prepared to give the names of the 400 national banks that have failed within the past few years, together with the reasons of their failures and the amount of money depositors lost thereby. The figures may all be relied upon as Mr. Mayer has taken them from reliable statistics.

The author's aim in writing on this subject, is to bring before the public the necessity of legislation to remedy the evils of the banking system. This has already been considerably agitated, but not as regards the security to depositors, and on Feb. 16th, 1898, the House passed a bill regulating the *manner* in which *loans* should be made, or in other words, a bill "to better *control* and to *promote* the *safety* of *national* banks," but mentions naught about securing depositors against loss in case a bank does fail. The report of the comptroller showed that 90 per cent of the national bank failures were due to the appropriation of the bank's funds by its officers. With such a large percentage to the credit of depositors compared to the stock capital in a bank, there is no wonder that legislators began to realize that something must be done to secure them against loss when banks fail. The bill above mentioned provides that "no national bank shall make a loan to the president or any other officer or employe of the bank until such officer or employe has submitted the proposition for the loan in writing to the directors and it has been approved by a majority of them, and in no case shall the loan exceed the amount permitted by law." A bill, similar to this, has twice passed the House and once passed the Senate with an amendment, but was there "pigeon-holed to die."

Judge Walter Q. Gresham, Gen'l. Jno. C. Black and ex-Congressman Coffeen, of

Wyoming, et al, have expressed themselves as in favor of protecting depositors in case of bank failures, and have so declared themselves to Mr. Mayer.

We are confident that all our readers will appreciate and approve this new departure and we give this notice so that all may secure the first article of the series.

Rio Grande Irrigation.

On the tenth of this month the case of the United States Government against the Rio Grande Dam and Irrigation Co. will come up for trial before the Federal Supreme Court. It is about two years since the first injunction was filed against this company, and in June, 1887, the case was tried before Judge Bantz, of the Territorial District Court, who dismissed with costs the injunction against the Company. The Government appealed the case to the Territorial Supreme Court and the ruling was again in favor of the company. The third trial will now come up before the Federal Supreme Court.

This case has attracted so much attention on both sides of the Atlantic (for English capital is the basis of the Rio Grande Company) and the decision will be of such vital importance to dwellers in the Rio Grande district, that a paper on the subject is pertinent and we therefore call the attention of our readers to the article in this issue entitled "Rio Grande Irrigation," by Nathan E. Boyd, M. D., which gives a concise history of the Company from its formation to the present time.

The headline in a Honolulu paper which reads "Santiago Must Be Ours," has furnished material for many newspaper witticisms. The eagerness Hawaii showed to "put his feet under the table and become one of us" as evinced by the pronoun "ours" causes one exchange to remark jocularly: "That's right, sonny; wipe your feet and come right in and take a seat at the table. Uncle Sam is not fond of diffident children." But in spite of the jokes there is probably not one who does not like that assumption of joint authority, that readiness to regard himself as one of Uncle Sam's family which is displayed in the headline, and it argues well for the future of the newly adopted child. Santiago is ours, Hawaii, not yours or mine

but *ours*, and may the interest and enthusiasm manifested by you at this early date in your adopted country never grow less

We have recently heard a great deal about Spanish honor" and now the Dreyfus case is sheddiddg light upon French

"honor." The ideas of the two countries are somewhat similar on this subject. Col. Henry confessed that he committed the forgery that convicted Dreyfus, but claimed that he did it because the proof against Dreyfus was absolutely necessary to maintain the honor and glory of the French army. These views of "honor" are a bit startling to us Americans; as we do not consider forgery and suicide necessary to preserve our honor. The Dreyfus case would do credit to the injustice of the middle ages, and that such a proceeding could occur in this day and age is shocking.

Newspaper report has it that France is on the brink of a revolution, due to these recent disclosures. Well, as the *Syracuse Standard* aptly remarks "Tragedy and Justice go hand in hand in France." The *St. Louis Republican* is of the opinion that "It would never do for France to disband her armies so long as the Dreyfus case is unsettled and Zola uncaptured."

Little islands that we hardly knew were on the map, have acquired great interest for us since the war. Possession often enhances the value of an article and so in this case the fact that Porto Rico is ours, causes us to have a respectful interest for the little blotch of yellow on the map, that represents now a part of Uncle Sam's domain. In view of this suddenly acquired interest in the little island, we read with attention the report of A. P. Austin, Chief of the Bureau of Statistics, Treasury Department, in regard to Porto Rico. "As a delightful winter resort, a valuable tropical garden and an important strategic point, Porto Rico is a valuable acquisition to the people and government of the United States," is the view expressed by Mr. Austin after a brief visit to the island. "It must not be expected," he continues, "that so small an island can become a large factor in supplying the \$250,000,000 worth of tropical productions which th

people of the United States annually consume, or that it can absorb a very large percentage of the \$1,200,000,000 worth of our annual productions—smaller in area than the state of Connecticut and with a population less than that of the city of Brooklyn, it may not be able to meet the somewhat extravagant expectations which enthusiastic people have formed with reference to it." The island is mountainous from center to circumference and as the 1,000,000 people who occupy its 3,760 square miles of territory have most of the available soil under cultivation, it will not offer many inducements to the homeseeker. Coffee, sugar, and tobacco are the principal exports, and agriculture is carried on in a very primitive manner.

Of the natives it may truthfully be said "Man wants but little here below," for they have no idea of luxury. Mr. Austin says that "A little rice, a very little flour, a few beans and plenty of bananas, plantain, breadfruit and vegetables satisfy their physical necessities, a few yards of cotton cloth for the adults and nothing for the children meet their principal requirements for clothing, while a few rough boards and a plentiful supply of plantain and palm leaves supply the material for the humble dwellings throughout the interior and in many of the villages." Education is, naturally, not of a very high order. Spanish is the principal language spoken, though the French settlers retain their own language and there are a few English-speaking people in the towns. As a compliment to the "change of ownership" one of the two daily newspapers published in Ponce prints one page in English. It is mostly extracts from our constitution and biographical sketches of our great men.

Porto Rico will offer attractions to Americans who are seeking a health resort or who desire a pleasurable winter resort, and with Cuba and Hawaii will help furnish a great share of our tropical imports, and enable us to expend our money among our own possessions.

Another Pioneer Gone. Sept. 2 marked the passing away of another Mormon pioneer—Wilford Woodruff, president of the Mormon church. He was 91 years of age and had been a Mormon

for sixty-five years, being one of the original 147 pioneers who reached Salt Lake Valley in 1847. He was beloved by all his people and the many thousands who attended his funeral services proved the esteem in which he was held. It is thought that Lorenzo Snow will succeed him as president of the church. It is a curious fact that New England, the home of Puritanism, furnished to Mormonism three of its four leaders, Joseph Smith and Brigham Young were from Connecticut, while Woodruff was born in Vermont.

The Czar's Manifesto. The Czar's peace manifesto has occasioned much comment.

While the press as a whole is inclined to regard it as something that should be hailed by all humane persons as "one of those flashings of light out of darkness which renew faith in God and man and the beneficent increasing purpose which runs through the ages," there is here and there a cynical editor who thinks that the czar's desire for peace is something after this fashion:

Russia—I will build a great battleship.

England—I will build two.

Russia—I will build four great battleships.

England—I will build eight.

Russia.—Let us have peace.

Our Foreign Trade. The fact that British imports into the United States have

fallen off greatly in the past year while American exports to Great Britain have greatly increased has been announced from time to time during the year, but the full year's figures, just presented by the Treasury Bureau of Statistics, brings to the surface some interesting details not heretofore published. These show that while the exports from the United States to the United Kingdom have increased 12 per cent, the imports from the United Kingdom have fallen off 35 per cent. The exports from the United States to the United Kingdom during the past year were in round numbers five times as much as the imports from the United Kingdom, the figures of the Bureau of Statistics being: Imports from the United Kingdom, \$109,138,365; Exports to the United Kingdom \$540,860,152.

The most decided decrease of imports from the United Kingdom to this country

has been in woolen tissues, worsted tissues, tin plates and sheets, jute manufactures, and linen manufactures, the import of the first in 1898 being only one-sixth of what it was in 1896; the second, one-fourth of what it was, and the imports of tin plates and sheets one-half of what it was in 1896.

In our exports to the United Kingdom the most decided gain has been in oats, of which almost five times as much is exported now as in 1896; wheat, which has almost doubled, and unwrought copper which is almost twice as large. Our export of horses and wood and timber also show a decided gain.

There has recently come into existence a club or society whose aim is to benefit the farmers' wives, and a vigorous protest is going up from these same farmers' wives, through the various farm papers, against being benefitted—that is benefitted in this way. This society is called the "League of Farmhouse Industries and Domestic Manufactures" and as its circular states, "was started by a few intelligent and sympathetic women for the benefit of a large and widely scattered community and has proven to be a signal success." Its purpose is to foster and direct domestic industries among the farmers families and provide a market for the handiwork of individuals. Or to put it plainly, its aim is to encourage women who live on farms to spend their spare

moments in work such as is done by the peasant women of Italy, Sweden, and Russia, homespun and embroidered linens, lace-making, the knitting of golf-stockings, etc., especial stress being laid on the golf stockings. The promoters of this benevolent scheme are society women, most of whom probably have no conception of what duties are comprised in the daily toil of the farmer's wife. The acquaintance we have had with the latter class leads to the belief that her day is crowded quite full enough without having any additional work placed before her. If she has a few spare moments after her work is finished it will be more profitable for her to lie in a hammock or read a good book than to amuse herself by knitting golf stockings or doing crewel embroideries in imitation of those of colonial times. The rest will do more for her than will the few dollars she might earn. What the average woman needs is not more work but more rest. You who envy the farmer's wife her outdoor life should do her work for a day and find how very little time there is to spend outdoors after doing the thousand and one things needful to be done within the house.

The members of this League undoubtedly mean well; they desire to help their fellows, but their efforts seem to savor too much of patronage to make them palatable to the average woman.



IRRIGATION IN COLORADO.

BY JOEL SHOMAKER.

Colorado is among the largest and most important irrigated divisions of Arid America. The state occupies a central position, amidst the grand Rocky Mountain sentinels, and stands without a peer in the vast resources of gold, silver and useful metals and minerals. Agriculture, through the medium of irrigation, has been developed until about 2,000,000 acres are under cultivation and over 1,200 miles of irrigating ditches carry water from the perpetual snow fountains to the fertile fields, orchards and vineyards. The present farm products reach an aggregate annual valuation of \$25,000,000, yet not half of the tillable area has been reclaimed from its desert condition, by the modern science of irrigation.

The present state was made a territory Feb. 28, 1861, and admitted into the Union Aug. 1, 1876, hence bears the very appropriate title, "The Centennial State." It contains 103,645 square miles, or 66,332,800 acres, of which about 4,000,000 acres can be irrigated and cultivated. There are seventy-two noted mountain peaks within the state borders, reaching an elevation of between 13,500 and 14,300 feet, being everlasting glaciers for filling the irrigation reservoirs and streams with an abundance of soil moisture for every acre that can be cultivated. The Rocky Mountains trending north and south, create an eastern and western slope, and supply the sources of the Arkansas, Platte and Colorado rivers and numerous smaller streams and creeks rushing from every canyon in the great chain. The natural rainfall for the state does not average fifteen inches annually, ranging from seven inches on the deserts to thirty inches in the mountains, therefore irrigation is essential to successful soil cultivation.

The last official census report shows that, in 1890, there were 16,389 farms in Colorado valued at \$85,000,000; the first cost of a water right averaged \$7.15 an acre and the annual cost of distribution was 79 cents per acre. Since that date the number of small farms has increased very rapidly and the acreage planted to fruits, melons, vegetables and alfalfa has been more than in all the previous years of the state history. In 1882 less than 200 acres had been planted to fruit trees and the general belief was entertained that Colorado could not produce fruits, but today over 50,000 acres are covered with the most productive orchards, vineyards and small fruit tracts growing in the Rocky Mountain dominions. The fruit and horticultural products of the "Centennial State," for 1898 will reach an estimated valuation of \$4,000,000, while other agricultural productions are worth probably five times that amount.

Colorado has increased in population so fast during the past eight years that the present estimates give about one half million inhabitants. The increase is due largely to mining and climatic conditions drawing those in search of fortunes and health, but many hundred sturdy farmers have yearly sought the irrigated valleys for creating homes of peace and plenty. The gold and silver output will reach at least \$40,000,000 every twelve months, and the men and families engaged in and around mining camps create an enormous demand for all kinds of farm products at remunerative prices. With these local markets, abundant water and excellent soil that produces wonderful crops of everything suited to a temperate zone, the inducements for home building are numerous and many have abandoned their rain farms of the east, for the certainty of harvests in the irrigated realm of never failing reservoirs.

Irrigation began in Colorado in 1870, with the settlement of the Union Colony, bearing the name of the famous journalist, Horace Greeley. This colony was practically the beginning of American irrigation on an extensive scale, being a few years later than the settlement of Utah and California, where no great colonial plans had been attempted. The canals were built upon a plan of co-operation, labor being reckoned as a basis of wealth, but the company held the money sufficient to meet anticipated expenses, and each farmer was to own his land in fee simple, but the irrigation canal was to be the property of the community. The cost, however, was far beyond expectations, but time has overcome all difficulties and land is worth \$100 to \$200 an acre in this colony, while the annual maintenance fee for keeping ditches in repair is almost nothing. The colony has been a complete success and Greeley is known throughout the commercial world as the home of the potato and the land of contented people.

The Arkansas Valley is a most prolific land suited to the growing of fruits and vegetables and new homes are being made in different sections every year. The melon output of Otero County for 1898 will be more than 600 carloads, being marketed principally in St. Louis and Kansas City. A few years ago this district was a wild, desert land, unknown except to roaming Indians, nomadic hunters and trappers and primitive gold seekers, but today it is the land of paradise to many happy, rural families. Every important place large or small in this valley and elsewhere throughout the state, is reached by some of the twenty-four railroads ramifying the mining and agricultural divisions. These highways of commerce have a combined trackage of about 5,000 miles and include such important lines as the Denver and Rio Grande; Union Pacific; Atchison, Topeka and Santa Fe; Colorado Midland; Union Pacific; Denver and Gulf; Rio Grande Western and other prominent roads.

The Western Slope includes all that country lying west of the Rockies, and is a most prolific land, especially in the valleys of the

Grand river, which forms the chief branch of the Colorado. Grand Junction and vicinity a few years ago appeared to be a desolate dreary waste, parched and killed by the hot sunshine of centuries, but now, what a change, when one beholds the rich vineyards laden with luscious grapes, big orchards bearing juicy peaches and choice red apples, and countless berry fields where the queen of fruits matures to perfection. Ditches have been taken from Grand river and smaller streams, pumping plants are in successful operation and reservoirs hold the floods of spring against the drouth of summer, thus equalizing the forces and supplying water for irrigation at the time it is most required. All systems of irrigation are practiced in Colorado and many of the most successful fruit growers insist upon giving their trees a thorough soaking in October or November and delaying spring irrigation till June.

In 1897 Colorado produced 3,353,975 bushels of corn, of which 201,238 bushels were sold or shipped out of the county where grown, as a surplus. The wheat crop for the same year was 5,117,544 bushels, the surplus shipments aggregating 2,814,649 bushels. The oat crop of 1897 was 2,968,540 bushels, and 860,877 bushels were marketed outside the county wherein the grain was grown. During the same year the estimated hay crop was 2,000,000 tons and the potato yield 4,000,000 bushels. The state had 151,721 horses, 8,755 mules; 85,669 milch cows; 935,826 range cattle; 1,623,089 sheep and 22,035 swine. The average prices for the principal agricultural products on the farm in 1897 were:—hay, \$5.50 per ton; corn, 38 cents per bushel; wheat, 70 cents per bushel; oats, 32 cents per bushel and barley, 51 cents per bushel. Local conditions raised or lowered these prices, according to demand and distance from market.

Colorado has fifty-five county divisions, each having distinctive peculiarities in soil, climate and water supply, depending much on altitude and location of mountains. Dry farming is carried on very successfully in some counties, such as Lincoln, Elbert, Sedgwick, Yuma, Washington and points east of Denver, but frequent dry seasons and consequent crop failures cause much hardship and distress. People have settled upon lands and grown excellent crops without water the same as in Western Kansas, and in some seasons the yields have even exceeded the irrigated fields, but the inevitable drouths have come, crops failed and hard times chased the settlers from their homes. While the drouths have affected the eastern counties some inexperienced farmers have lost much money and become discouraged in trying to make water run up hill or have destroyed their crops because of too much downhill ditching. But irrigation is generally understood by the present farmers of the "Centennial State" and we seldom hear anything but praise for the irrigation canals and ditches.

Many eastern readers of *THE AGE* write me scores of questions about the prices of land, water rights, farm supplies, and whether

small colonies could locate on government land and construct their own ditches. In reply to those who contemplate asking about Colorado I would say that the prices of land range all the way from \$5 to probably \$500 an acre, according to location and improvements. There are hundreds of valleys in the western states where colonies can be located on government land and build their own ditches. Water runs to waste during the spring season in almost every stream, even though old settled colonies have appropriated the summer flow, and in the rivers there is an almost unmeasurable output at all seasons. Such rivers as the Grand in Colorado, the Snake in Idaho, the Columbia in Washington and Oregon, the Yellowstone in Montana and their many tributaries carry millions of cubic feet down to the oceans that should be utilized in irrigating vast areas now practically worthless.

Small colonies can control the small streams and in some instances tap the large rivers, but the states and the nation will soon combine capital and labor and construct canals in the several arid sections that will reclaim millions of acres. Colorado has some state ditches, Montana is building some and others are falling into line to fulfill the terms and condition of the Carey act, by which at least 1,000,000 acres may be redeemed through state control and become the property of individual farmers. No one need fear to locate in the west because irrigation companies have failed and district laws have been declared unconstitutional. There is an unlimited and almost boundless scope of country yet to be made the home of presperous irrigation farmers, and the water supply is inexhaustible. Many combinations of peculiar conditions have contributed to the downfall of irrigation enterprises, against which farmers and capitalists could not successsfully combat, but conditions are changing, have changed, and better days are coming.



UNPROFITABLE IRRIGATION WORKS.

NO. V.

BY T. S. VAN DYKE.

The most wild-eyed declaimer against capital will admit that under our present social system it is entitled to reasonable interest on any investment to serve the public. In California the constitution, supposed to have been framed to suit the "sandlot" mob, provides that this shall not be less than seven per cent and allows it to run as high as eighteen. California has as choice a collection of high kickers on the privileges of capital as the world can show, yet in twenty years there has been no fault found with this clause of the constitution, no offer to change it and in every case where rates have been fixed under it there has been a general demand that they be fair to the company. It is therefore fair to assume that nowhere would five per cent interest be considered high for the risks involved in irrigation works but that much more would generally be allowed.

A new irrigation system costs one million dollars. Five per cent on this is fifty thousand a year. The running expenses would be at least ten more, under the most rigid economy; and the maintenance fund, if the plant is one that can easily depreciate, will be much more. These are always allowed for in fixing the rates and it is common, and often just, to add in a sinking fund. But let us leave out the latter and the maintenance fund and say the amount to be raised the first year from tolls on the water is sixty thousand dollars.

How much land is going to take water the first year under such prospects? Are you, dear reader, going to irrigate until you have some idea of how many others are to join in to reduce the burden? How many acres have you ever seen irrigated under a new ditch the first year under the most rapid rate of settlement the most rapid part of our rapid country has ever yet seen? Did you ever know five thousand acres to use water the first year? Did you ever know three thousand? Is not two thousand above the average even where the rates are fixed at less than three dollars an acre and generally at less than two by a special contract that is perpetual?

Under such circumstances who is going to improve the second year or the third? Call up your boy who has just finished his primary arithmetic and he can soon give you the answer. It is plain that any such principle as making annual rates pay a reasonable interest on the works kills instantly the prospects of both parties and is as bad for the irrigator as for the company. The rates must be set low or there will be no settlers. It is for the interest of both parties to have them fixed forever. It is as plainly for the interest of both that most

of the interest on the investment must be met in some other way. Over ninety-nine per cent of the irrigators of the United States have recognized this and submitted cheerfully in one of three ways.

By paying a wet price for dry land, in some cases as high as five hundred dollars an acre for land that without the water would produce next to nothing.

By paying the same wet margin for stock in a company that represented the right to irrigate.

By paying for what is called a "water right," which is a contract or deed of water.

But don't these amount to the same thing if you calculate interest on them? Of course they do. But human nature says no, always has said no and always will say no. That settles it. All of these are subject to an annual payment which is just about enough to maintain the works in good shape and cannot be the basis of any profit worth talking about without danger of making the annual payment so high as to act as a damper upon settlement. The second case makes a land owner's company where the annual rates are immaterial, because if there is any profit paid by the rates it would come back in dividends. Hence they are set at only a maintenance figure. The first case generally results in a land-owner's company, the stock being turned over with the land. But this is not always the effect. It generally should be, as there is little chance to make any profit out of annual rentals that can be safely charged upon the land. Unless the water is valuable also for power or something similar, or some of it available for city use, the stock had better be sold out with the water and the whole turned over to the irrigators. In California these are the most successful of all the companies and there is hardly ever any trouble in them.

These principles have stood the test of many years. Almost all the irrigation of the United States has practically been done under them. It is therefore safe to assume that they will continue to rule for many a year to come. If principles of law founded on cases in no respect parallel—such as city supply—step in and conflict with them farewell all farther development of water for irrigation by private enterprise. Nothing remains but state or government aid and the day of judgment will overhaul most of us before that machinery starts running. The sooner this is regulated by statute or constitution the sooner the building of irrigation works will again begin. There are now many cases where the law need not stand in the way, but capital once scared is scared all around.

There are many more objections to the principle that irrigation works must be run as city works are and that a contract for water at a fixed rate is invalid. But I can stop to mention only one of them. And this is so bad that it is not necessary to mention the others.

If the landowner cannot bind himself and the agreement of the

company is equally void it is plain that the right to water depends upon the tender of the rates fixed by law. According to this how much water am I to have? The law will say so much as is reasonably sufficient. This answer might do for a greenhorn but not for one who knows anything about irrigation. Before I plant a tree or an alfalfa seed or a vine I must know how much water I am to have during the year, and not this year only but the next and the next ten and the next twenty. Not only does my orchard need such certainty, but if I want to sell, it governs the price of the land. I also want to order water several days ahead, sometimes a week or more so that I can have plenty of time to get my ground all ready for it. Am I, with an old orchard in full bearing, to be at the mercy of any Chinaman with a temporary vegetable patch, or some new alfalfa rustler who happens to be ahead of me with a tender of the rates and a demand for water? And if the company can make no contract how can it even save me a head of water for a full run a week from now if in the meantime somebody putting himself in the legal position to demand it comes for it? In a spell of hot weather for instance, when there is a rush for water, what a beautiful state of affairs this will make. Is the company under any obligation to say to any one. "No sir you cannot have more than so much water or have it more than so long, for this hot spell diminishes the supply and greatly increases the demand and there are others beside you to be considered."

Granting that it could legally refuse what was claimed as necessary for his crops by one tendering the full rate—a dangerous thing to do with the evidence of damage all in the hands of the other party—what inducement is there for the company to refuse? In contemplation of law it gets so much money for so much water and it is none of its business how much water any one wants as long as it has the water and he is ready to pay for it. A few irrigators in a pinch could thus leave the others high and dry and the respective values of the crops would be quite immaterial when there was an abstract question of law involved. Now the company under contracts sees that every one is treated alike. The man with a contract is put on the list of consumers and so much saved for him unless he chooses to let it run away. When there is a shortage or a big rush in a hot spell, and often both together, the company regulates everything so that every one is taken care of. And one may put in his order for so much water, so many hours or so many days run, even weeks ahead with the certainty that no one else can get it and that exactly on the minute the full quantity will be turned out to him for the required time. Any attempt to irrigate in any other way will lessen a saint's prospects of heaven.

And still we are not through with this one point. Under contracts the company sells so much water and no more. To the credit of companies it must be said that over-selling the supply is exceedingly rare

and more the result of bad calculation by the engineers than the result of intention. Companies that intend to stay in the business are careful not to oversell for it means too much trouble. The liability would be too great and the whole community would be against them in case of suits for damage which would be certain to follow whenever any shortage not due to an unusual season might occur.

But if a company is not under contract to furnish any given amount of water under what obligation, moral or legal, is it to say it will not supply any new land with water, because all that can be safely furnished is already using it? If the only obligation is to furnish to the first one that makes a tender of the rates and demands what he says his crop needs then it is of no interest to the company if one entirely new man takes it all at a time of pressure from hot weather when a hundred old consumers are needing it badly. If furnishing under contract all consumers will be put on an equal footing and the number limited. But if there are no contracts why should the company limit the number? And can it safely refuse one man who tenders the rates all the water he wants, on the ground that some of his neighbors, who have not yet made their demand, may want some? The chances are that under a strict construction of the law the company would be liable for damages, and could not set up the possible needs of others as a defence.

So far we have considered the water as coming from a flowing stream in which the company gets a right to so much water, decides that it can sell only so much and makes that much serve all its customers equally. The principle that the foremost in the scramble with a demand for water and a tender of the rates is foremost in right, is bad enough in such a case. But what shall we do when the water is in a reservoir which is to be the great resource of the future, in fact almost the only resource for many large sections? Now a company can say "The capacity of this reservoir is indeed so much but we don't believe it will fill every year and propose to carry so much ahead to make our patrons safe. We sell on that basis. Every man who buys of us will have so much held for him against all contingencies except one of those extraordinary drouths against which no one can figure and which he would have to stand if he had a reservoir of his own."

Under the other system how much water would they have in that reservoir? Under what obligation, legal or moral, would the company be to hold back any of it? Would not their present interest rather lie in running it all out as fast as any one would pay for it? If somebody should sue for non-delivery and prove that there was so much water in the reservoir at the time of his tender how could the company prove it did not have the water? And what right would it have to set up the possible claims of some possible irrigators? For under the no-contract system all irrigators are merely possible irrigators, because the amount of water they will want and the times and heads and runs

ney will want are unknown until they make their demand. I mean legally unknown because the company would have no right to recognize them as it now does.

I have dwelt so much on this because it scares capital, scares it now and is going to scare it more. It is of little use to say that capital should not be scared. Capital will indulge its privilege all the same and be scared in spite of us. Hence this question should be set right as fast as possible by law or constitutional amendment and people allowed to make such contracts as they choose. As a matter of fact there is very little reason for getting scared. I believe the decision of Judge Ross in the case referred to will be sustained on appeal. It is based on the peculiar wording of the constitution of California and is backed by numerous cases in which the principle is clear. The case was one of a naked contract to furnish appropriated water at a certain price each year. Had the contract been by deed of a definite quantity reserving a contribution for maintenance or interest on deferred payment it would probably have been quite different. Especially so if the payment had been made a lien on the land. Deeds of appropriated water, either of the whole appropriation or of a part, have never been questioned that I know of. They have been made for years in every state where irrigation is practiced and sustained as deeds of real estate everywhere. A deed assented to by acceptance and charging the annual payment on the land as a lien was sustained by the Supreme Court of California some eight years ago under a section of the code which allows liens on land to be created by the owner of the land. A deed of water as of real estate, reserving a vendor's lien for part payment would probably be good anywhere. I drew up a deed some years ago to cover all points, which has been pronounced impregnable by several of the best lawyers in the state, and no buyer of water has ever yet objected to its terms though many have taken it.

The decision referred to has no application to land owner's companies. It has been decided that they are not subject to the legal rates and are not bound to furnish water to outsiders. They are exactly like a social club furnishing themselves. A hundred or a thousand men have the same right to own and distribute water jointly and fix the contribution of each toward the expense of operation and maintenance of the ditch that a single man has to take out and own the small brook that irrigates his single ranch. It matters not whether his title is by appropriation or as riparian owner. Appropriation for such purpose has never been questioned any more than it has for mining or power. A body of land owners do not appropriate for sale but for their own use. But this does not prevent a man from making a private deed of the water if he does not want it himself and the chances are that he can attach what strings to it he chooses, the same as if it were land, deeds for water being the same in all other respects as deeds of land. In the same way they can sell some of the stock

which represents the same right and is really a deed of a part interest, the title being in the company but in trust for the holders of the stock. The stock may be made subject to conditions as well as a deed for no one is obliged to take it. And there is no more reasonable condition than contributing equally toward the expense.

As the land owner's company is now the only form of company that capital can wisely consider and as money enough can still be made through that form of company where properly handled there is no occasion for being alarmed at the condition of the law. But as it is I should not be at all afraid to buy and improve under a common company everything else being equal. Whatever the effect of the law may be in theory the company will take good care of the man who has paid what the water is honestly worth and will not postpone him to one who wants something for nothing when he knows that it would ruin the company if all did the same. The ditch tender and the secretary can easily make such an irrigator wish he had never been born and he could never prove where he was hit. I would want no better fun than to supply the water to a few such customers for a season and I would not get the company into any lawsuits either. The last one of them would buy a contract in a year or two. For the fact that irrigation works cannot be tapped at will by any one, as in the city works, but the water must be taken in blocks, the size and continuance and times of taking of which must be under the control of the company, makes the company master of the situation and it has the sympathy and support of every man who is irrigating under a contract. With such backing and such control of the facts in the hands of the company the man who wants water for less than it cost will find a mere legal right a mighty poor support for trees or alfalfa, especially in a severe hot spell.

RIO GRANDE IRRIGATION.

THE HISTORY OF AN OFFICIAL CRIME.—WHY AMERICAN INVESTMENTS ARE BOYCOTTED IN EUROPE.

"We have also touched upon one sad feature and it is one which we found little pleasure in handling. That is the shameful corruption which lately crept into our politics. But I have a great, strong faith in a noble future for my country. A vast majority of the people are straightforward and honest, and this state of things is stirring them to action. If it would only keep on stirring until it became the habit of their lives to attend to the politics of the country personally, and put only their very best men into positions of trust and authority! That day will come."—Mark Twain's Preface to the "*Gilded Age*."

American industrial securities were for many years so exceptionally popular with European investors, British investors particularly, that the present uncompromising, widespread prejudice against American undertakings seeking capital abroad, demands some attempt at explanation. Possibly the following particulars of departmental juggling with America's reputation for probity and good faith may serve to throw some light on the question, and, if taken as an example of American official methods largely explains why it is that the United States as a field for the investment of cheap European capital has been so completely abandoned in favor of Canada, Mexico, Argentina and other South American countries, South Africa and Australasia.

It has long been recognised that the two things needful to insure the prosperous advancement of the Rio Grande Valley in southern New Mexico and western Texas, admittedly the finest fruit and vine growing section of the North American continent, are

1. A comprehensive and scientific system of irrigation, including suitable and adequate means for conserving the vast volume of flood waters hitherto allowed to flow unused down the Rio Grande to the Gulf of Mexico and
2. A legitimate means of interesting capital in the development of the valley's exceptional agricultural possibilities—so long dormant.

Many other sections of the arid belt in the United States, notably in southern California, Colorado, Arizona and Utah, less favored by nature than the Rio Grande Valley, have, within a few years, been transformed from comparatively unproductive wildernesses, supporting but sparse populations, into prosperous rapidly growing communities, while the Rio Grande Valley, deservedly described as the Nile Valley of America, with all its vast potentialities for the production

of wealth, with its ideal climate, fertile soil, and great fertilizing source of irrigation, has slumbered on year after year in profitless lethargy, hopelessly awaiting the advent of state aid, or some other form of extraneous assistance.

From time to time, during the past fifteen years, various public spirited local residents, realising the vital importance of providing an irrigation system upon a sufficiently large scale to provide water for the service of the Rincon, Mesilla and El Paso sub-divisions of the valley have endeavored to awaken the leading citizens and land owners from their Rip Van Winkle like repose. Scheme after scheme has been proposed, government after government at Washington importuned, and the co-operation of the Mexican farmers on the Mexican side of the river solicited, but local jealousies, imperfect plans and conflicting interests invariably barred the way.

For a time the activity in railway construction in Western Texas and Southern New Mexico seemed to promise permanent and progressive prosperity for the Rio Grande Valley, but the water question remaining unsettled, affairs soon drifted back to the old dead level of passivity.

A few determined advocates of enterprise and progress continued seeking the aid of capital, and finally, after years of effort and repeated failures, at home and abroad, to secure the large amount of capital required to carry out an irrigation scheme that would properly control and utilize the waters of the Rio Grande, and after Congress had again and again declined to seriously entertain the problem of Rio Grande irrigation, the Rio Grande Dam & Irrigation Company was incorporated, under the laws of New Mexico, with the declared intention of impounding and utilizing the waters of the Rio Grande. Shortly after the incorporation of the company steps were taken to secure the approval of the Secretary of the Interior, of the company's filings for a dam and reservoir site at Elephant Butte, in Sierra County, New Mexico, the only feasible storage reservoir site on the Rio Grande in southern New Mexico. Complete surveys were made, elaborate plans were prepared, and all the requirements of the territorial and federal laws having been fully complied with, the company's rights and titles as granted by its charter of incorporation under the laws of New Mexico, were in due course confirmed by the federal authorities.

The Secretary of the Interior, having formally approved of the company's plans, vigorous efforts were made to raise capital on the bonds and shares of the company. Unfortunately the financial depression throughout the West, consequent upon much ill-advised official tinkering with the tariff and currency questions, rendered it impossible to raise in America at even the most usurious rates, the large amount of capital necessary to carry out the proposed irrigation works. In Europe the discreditable histories of the bond issues of certain California and Kansas Irrigation Companies were too fresh in the

public mind to admit of the placing of an American Company's securities.

Large sums were expended in properly presenting the enterprise, and every conceivable channel was tried in vain; the great financial houses in England protesting that British investors had already suffered too largely through investing in the bonds of American companies; that the finances of the United States were too unsettled; the laws protecting foreign bond holders much too lax; that directors of American companies were not, under American laws, sufficiently responsible for good management; that the United States might declare for silver and repudiate all obligation to pay gold bonds in gold, and that in the event of the bond holders having to foreclose, the Alien Land Law would entail realization at a sacrifice. Financial house after house raised the same series of objections, one and all pointing out that the history of foreign investments in Texas, Kansas, Missouri, etc., etc., tended to show that ignorant and hostile legislation may, in the future as in the past, depreciate or possibly even invalidate the foreign bond holders' security. While all admitted the obvious merit of the company's undertaking, none would risk investment. To such a deplorable state has the asinine follies of American officials and American legislative bodies brought American credit.

All new countries must, in the nature of things, depend upon monetary assistance from without for the development of their resources. Much of America's wonderful progress would have been retarded half a century or more had it not been for the powerful aid of foreign gold. Individuals, communities and nations borrow, all justly claiming the right to borrow in the cheapest market; but notwithstanding recognized economic laws—laws as clearly defined and unalterable as any other forces in nature—governing the relations of labor, capital and national resources, American legislatures have repeatedly enacted laws openly antagonistic to foreign capital. The result, dear money and widespread disaster, obvious conditions of cause and effect, have in every instance become immediately manifest. Foreign investors have largely withdrawn their capital, often enforcing abrupt realization and reluctantly ruining thousands, leaving American bankers, mortgage companies and other money lending institutions practically the only source of monetary supply. By paying high rates of interest, the soundest of American financial companies have continued to raise capital abroad, which they in turn advance to our western farmers and merchants at more or less exorbitant rates. Ignorant legislative opposition to foreign capital, by retarding development and lowering the price of labor, has thus been one of the chief sources of ruin for the farmers of the western states.

It is a lamentable fact, perhaps not known to the majority of the American people, that with certain isolated exceptions, every American enterprise, let its prospects and advantages be never so well

proved, is looked upon in Europe with suspicion; our venal vote catching politicians having so thoroughly destroyed the confidence of foreign investors to our individual and natural integrity. The term American was at one time synonymous with honesty; few Americans doing business abroad find it so at the present time, quite the reverse.

In view of the wide-spread suspicion of American investments, it was not surprising that the Rio Grand Dam & Irrigation Company signally failed to place its bonds. But the directors continued to persevere in their efforts to carry out the objects of the company, being assured of the unanimous support of the land owners in the valley, and realizing that unless early steps are taken to impound the flood waters of the Grande, the farming interests would for the most part speedily fall into desuetude,

Finding that in the state of the money market it would be impossible to place the shares and bonds of the American company, and being advised that investors abroad would be more likely to entrust their money to an English company, managed by a Board of Directors of high rank and standing, responsible to the shareholders under English law, it was decided to raise the capital necessary for the proposed irrigation works by leasing to an English company, to be incorporated under the laws of England, the American company's franchise rights, privileges and undertakings. The best legal advice obtainable was taken as to the legality of the American company's rights, and upon being satisfied that a lease giving control only of the American company's property could not be construed by the most violent jingo of the anti-English party as constituting the holding of real estate, or as being in any way a violation of the Alien Act, the English company was incorporated.

A Board of Directors consisting of gentlemen of exceptionally high standing was, with great difficulty, formed, capital was underwritten, and shares and debentures of the English company were issued to the public. Capital was underwritten and subscribed largely upon the strength, high rank and representative character of the Board of Directors, and in the course of a few weeks after the issue of the prospectus, the chairman visited the Rio Grande Valley on behalf of the company. Upon being satisfied by the company's legal advisers that the American company's titles were unassailable, and English company's lease legal, arrangements were made for the construction of the proposed irrigation works. It was never for a moment considered possible that American state officials could be capable of secretly plotting to invalidate the valuable rights legally conceded by a previous administration.

Encouraged by this new Anglo-American enterprise, English investors evidenced an inclination to become somewhat less distrustful of American honesty. The market for American irrigation securities generally improved, and the long prophesied era of prosperity for the

Rio Grande Valley was at hand, when, without a word of warning, and notwithstanding that the American company's rights had been officially confirmed by a member of Mr. Cleveland's cabinet, and that over a year had elapsed since the Secretary of State and the Secretary of the Interior had received direct communication from the officers of the English company with regard to the intention of that company, communications which were officially acknowledged, the authorities of Washington, in direct violation to every canon of good faith and public decency, suddenly instituted an injunction action with the avowed intention of confiscating the valuable irrigation works that were being carried out with friendly English capital. In the absence of any legitimate grounds for attacking the company, the action was based upon a preposterous allegation that the company's works would interfere with the navigability of the Rio Grande. The navigability of the Rio Grande forsooth! Could anything be more absurd? The Rio Grande in New Mexico is not, and never has been navigable, and in view of the officially published opinion of the late Attorney-General Harmon, and the fact that the authorities at Washington have for years maintained, in opposition to Mexico's claim for joint control of the river, that the Rio Grande is *not* a navigable stream, that a special committee of the senate conclusively proved it to be non-navigable, it is not in the circumstances surprising that the shareholders in the English company, and the public generally, look upon such a flagrant outrage of justice as but another instance of American sharp practice, this time in the highest quarter.

Needless to say Americans resident in England, and interested in the enterprise, cognizant of the true fact of the case, jealous of their country's honor and anxious to exonerate American officialdom from the charge of acting in bad faith, endeavored to reassure the shareholders in the English company by offering the only possible explanation, namely, that the authorities authorized the action, knowing that it must result in a decision in favor of the company, in order to satisfy Mexico and the advocates of an international storage dam at El Paso, that neither by treaty nor otherwise may the United States Federal Government invalidate existing rights or prevent citizens of Colorado and New Mexico from impounding the waters of the Rio Grande for irrigation.

It should be stated that with the exception of General Anson Mills, U. S. A., the leading spirits of the so called international dam scheme are not American citizens, nor residents in the United States. The principle supporters of the International Dam scheme consist of a small coterie, holding options over, or owning the greater part of the Mexican lands that would be benefited by an international dam at El Paso. These gentlemen have vigorously backed Mexico's demand that the Rio Grande should be under the joint control of the two republics, and they have for some time been exceedingly active in urging

the authorities at Washington to build, wholly at the expense of the United States, an international dam at El Paso for storing the waters of the river.

For reasons that will probably be made public at an early date, it would also appear, judging by certain departmental correspondence only recently brought to light, that this so called International Dam scheme is not altogether lacking in official support at Washington, and that a most iniquitous "job" has been attempted.

Although the Elephant Butte Storage reservoir of the irrigation company may be made to serve every purpose, namely supply the whole valley of the Rio Grande above as well as below El Paso, on both the American and Mexican sides of the river, at far less cost than would have to be incurred by the United States in carrying out the proposed International Dam scheme, the promoters of the international project and their official backers, anxious to profit by the millions Uncle Sam would have to expend in compensating for the valuable properties that would come within the proposed international reservoir, have not hesitated to maliciously misrepresent the objects of the English company, and have endeavored by every possible means to have the waters of the Rio Grande Dam & Irrigation Company's rights set aside on the ground that in leasing its franchise and undertaking to an English company, it had violated the Alien Act. Having failed in this, the authorities were beguiled into an action against the company with an object of invalidating the company's titles and confiscating its works on the absurd ground that the Rio Grande is navigable, and that in damming the Rio Grande in New Mexico, above El Paso, section 7, Ch. 907, Act of Congress 1890 had been violated by the company. The act in question reads as follows:

"That it shall not be lawful to build any wharf, pier, dolphin, boom, dam, wharve, breakwater, bulk-head, jetty or structure of any kind outside the established harbor lines or in any navigable waters of the United States where no harbor lines are or may be established without permission of the Secretary of War in any port, roadstead, haven, harbor, navigable river or other waters of the United States in such manner as shall obstruct or impair navigation, commerce or anchorage of said waters."

To those familiar with the characteristics of the Rio Grande, the contention of the authorities that this river is navigable in New Mexico is more suggestive of dishonesty than possible ignorance.

So far the attempts to invalidate the company's rights and confiscate its works have been in vain. On the 3rd of June, 1897. Judge Bantz, of the Territorial District Court, dismissed with costs the injunction against the company, and upon the Government appealing to the Territorial Supreme Court, that court also dismissed the appeal with costs in favor of the company.

Much evidence was taken, and it was ruled that

1. "Under the treaties with Mexico each republic reserves all

right within its own territorial limits. This would have been so upon principles of international law without such reservation. States lying wholly within the United States belong exclusively to it, and the soil within the United States is not burdened with a servitude in favor of Mexico, in respect to any duty to so discharge the water as to promote or preserve the navigability of the Rio Grande.

2. "It is not the capacity of a stream to float a log or row a boat which renders it a navigable river within the Acts of Congress (1890 and 1892) but whether, at regular periods of sufficient duration and in its regular condition, its capacity is such as to be susceptible of beneficial use as a public highway for commerce. The Rio Grande in New Mexico is not a navigable river.

3. "The power to control and regulate the use of waters not navigable, exercised by States and Territories in the arid West, was confirmed by Congress by the Act of 1866, and that power now resides wholly in such States and Territories under the Act of 1877 and subsequently, therefore the diversion of such local waters is not a violation of any Act of Congress even though the navigable capacity at a distance below may become thereby impaired." (Vide Transcript of Record No. 753 the Supreme Court of New Mexico, July term, 1897).

The two decisions having been so decisively against the Government the directors of the English Company naturally inferred that the authorities would promptly desist from further needless persecution, and have the grace to at once indemnify the company for costs incurred, etc., but they were sadly mistaken. The Attorney General allowed the matter to drag on until the last moment permissible by law, and then filed an appeal to the Federal Supreme Court. Urgent representations, explaining the injustice of the delay were made at Washington; petitions were sent in by the inhabitants of the valley and every possible effort was made to induce the department to accept the decision of the Territorial Supreme Court as final.

The company's representatives were at first given to understand that probably the decision of the Territorial Supreme Court would be so accepted, but after further vexatious loss of valuable time they were told that this could not be done, though an early hearing before the Supreme Court was promised. This was last autumn; subsequently the company's attorneys were definitely informed that the hearing of the appeal would come on early in January, 1898. January passed, and they were at last advised that the date of hearing had been fixed for the 10th of October.

Two years wasted, costly half finished works destroyed by floods, ruinous litigation forced upon a friendly English company, the future of a great public enterprise jeopardized, English investors disgusted, and the farmers in the valley deprived of water for the irrigation of their lands, all in the interest of General Anson Mills of the U. S. Boundary Commission and the German and Mexican speculators backing the international dam scheme. Is it at all surprising that English investors have no confidence in American undertakings?

That General Mills enjoys influential support at Washington is

evident, and doubtlessly his untiring devotion to the cause of the Mexican farmers—on the Mexican side of the Rio Grande, and his energetic opposition to the just demands of his countrymen in New Mexico dependent upon their farms for a livelihood, meets with gratifying recognition—in Mexico.

The bulk of the lands of the Rio Grande valley are at present without water. The irrigation, such as exists, is inadequate, and the farmers in the valley to a man support the company. Petition after petition, signed by ninety per cent. of the land owners in the valley, supporting the company's undertaking has been presented to congress in vain; General Mills' discreditable attempts to commit the United States to an expenditure of between \$5,000,000 and \$6,000,000 in carrying out the needless impracticable International Dam scheme being apparently of paramount importance in the estimation of the department compared with so common-place a thing as justice to the English investors or decent regard for America's reputation for fair play and good faith.

The company's undertaking to create the largest artificial lake in the world; to impound for the use and benefit of American citizens the flood waters of the Rio Grande, now allowed to run to waste; to make lands now worthless equal in value to the best fruit lands in southern California; to expend vast sums in colonizing the Rio Grande valley and in developing its splendid natural resources; to create a revenue producing, tax paying property capable of providing prosperous homes for thousands of families, has, it would seem, been considered of no value to the nation in comparison with the laudable ambition of the International Dam schemers, plotting to rob the United States treasury. Could anything be better calculated to bring American institutions into contempt than this deplorable exhibition of official unwisdom and glaring disregard of public interest?

The Government's seemingly unscrupulous support of the International Dam schemers' plot for plundering the treasury would perhaps be less culpable and offensive to public morals if it did not tend to convince the world at large that the current suspicions of things American are justified by facts.

The company's financial supporters in Great Britain are naturally indignant at the brazen attempt to wreck the company, and they look upon the injunction proceedings as wholly unjustifiable and as a shameful example of official persecution. Needless to say the government's attitude towards the company is a great blow to American industries seeking capital abroad. The apparent official disposition to support General Mills in his efforts to invalidate the company's titles in the interest of the International Dam scheme has excited among British investors much bitter criticism of things American; the attack upon the company being most unfavorably contrasted with Great Britain's friendly support in the recent Cuban difficulties.

There is no question but what France, Germany, Austria and Russia had decided to intervene with the object of making Cuba another Crete. Spanish sovereignty in the Antilles was to be maintained, and an autonomous government established in Cuba under the protection of the European concert. Having regard to the Venezuela dispute, England's adherence "in the interest of peace" was considered certain, but the continental diplomatists found to their astonishment that England not only refused to be a party to any attempt to impose conditions upon the United States in the interest of Spanish and French holders of Cuban bonds, but Her Majesty's government even declined to agree to remain neutral. The result was both ludicrous and instructive, the violent change of front on the part of the Russian, French and German press being so obviously inspired.

In Great Britain the desire for Anglo-American rapprochement is not a superficial sentiment of the moment. It is deep rooted and genuine, and British shareholders in English companies doing business in America find it difficult to reconcile the attitude of the American Government towards the Rio Grande company with the recent whole-sale shouting in the United States of "God Save the Queen." Even the speedy settlement of the Behring sea award failed to arouse more than a knowing smile. The Britons are essentially a commercial people, and like all commercial races lay great stress upon public and individual probity.

Notwithstanding the high esteem in which the better class Americans are held abroad it is difficult to induce the average Englishman to believe that the authorities at Washington brought the Rio Grande injunction action in good faith, or fail to realize the injustice of the attempt to ruin the Rio Grande, or that the department is ignorant of the way General Mills has prostituted his official position in the interest of the group of speculators backing the International Dam scheme, with which he is identified.

Not content with circularizing damaging and false reports as to the objects of the English company, its solvency and the legality of the company's titles, General Mills and his official supporters have done their best to have the rights of the English company invalidated by Act of Congress. Quite recently they succeeded in getting a proviso tacked on to an innocent little bill, which was entitled "*An Act to permit the use of the right of way through public lands for tramroads, canals, and reservoirs and for other purposes.*" By persistent lobbying, and aided by certain departmental officials, Mills had a proviso inserted, which in substance provided that none of the existing laws should be so construed as to "Authorize the appropriation or storage of the waters of any stream or river, *State, interstate or International*, to which others below have right by prior appropriation, or the obstruction or interference with the navigable capacity of such streams or rivers, and such appropriation or storage, obstruction or interference,

is hereby prohibited." Fortunately the company's attorney discovered this proviso, and secured the recall of the bill from the House.

Mills and his associates subsequently had the following proviso inserted: "That the Secretary of War is hereby authorized to secure from the State of Texas the necessary land on which to build a dam on the Rio Grande at or near El Paso in that State. *No reservoirs for the storage of water shall be built on said river within the boundaries of the Territory of New Mexico without an Act of Congress authorizing the same.*"

This was nothing more or less than a disgraceful legislative attempt to destroy the right to impound and appropriate the waters of the Rio Grande for irrigation in New Mexico previously conceded to the Rio Grande Irrigation Company. The bill with the pending motion having been sent back to the committee, the company's attorneys ultimately succeeded in having the amendment knocked out; though so long as General Mills is backed up by the authorities, it cannot be hoped that he and his friends will desist from their attempts to defraud the English shareholders.

The official support afforded to General Mills is still further evidenced by the fact that in February last he managed to get a resolution through the House calling upon the President to report upon the proceedings of the International Boundary Commission, including correspondence etc., relating to the Rio Grande, also to include the draft of a proposed treaty between the United States and Mexico, a treaty wherein the United State Government would covenant to build the proposed International Dam at El Paso.

The President responded to the resolution, and presented a report of over 210 printed pages, the very character of which makes it apparent that Mills or some one with an axe to grind manipulated the report in the State Department. Numerous important documents upholding the company's rights were entirely suppressed or merely mentioned, every particle of record militating against the Mills International scheme having been omitted. All of General Mills misleading letters and reports were set forth in large type.

It goes without saying that President McKinley could not have been aware of the offence committed by Mills and his confederates, but the State Department having been advised of the manner in which the confidence of the President has been abused there can now be no excuse for delay in bringing the actual offenders to book. General Anson Mills' conduct demands immediate investigation.

The recent heroic achievements of the American army and navy excites the admiration of the world, but the charge of dishonesty levelled by commercial nations against American public officials becomes by contrast all the more damaging to American credit.

Public opinion throughout the west is exemplified by the following excerpts from a recent editorial in the "Denver News."

"The big Rio Grande Dam Company in New Mexico, whose construction was stopped by an injunction last year, brought by the Federal Government is said to be preparing a suit against the United States for damages. There is no question but that the suit brought against the company was an unjust one and was instigated by rival interests. The 'News' freely discussed the issues at the time, and the decision rendered by Judge Bantz in favor of the company and subsequently confirmed by the Supreme Court of New Mexico was approved in these columns. Undoubtedly the Irrigation Company suffered great loss, but against the United States it has practically no redress. It might bring a suit in the Court of Claims, but if a judgment were rendered in its favor it would then have to obtain a special appropriation from Congress. The reluctance with which Congress passes appropriations of this nature is well known. The great grandchildren of a man with a claim against the Government may realize some benefit out of it, but he never will."

It is alleged, and to a large extent credited by the English shareholders that the government is determined to one way or another legislate the company's rights out of existence. This, of course, cannot be legally done, the Supreme Court having again and again ruled that no Act of Congress may be made retrospective to the extent of invalidating existing rights. Possibly the authorities count upon exhausting the patience of the English shareholders to such an extent that they will abandon the enterprise. If this is their object, they have certainly gone about it in a masterly way.

A number of the wealthiest men in England are interested in the undertaking. They believe in the enterprise, appreciate its merits and command ample capital, but, unhappily, they no longer have confidence in the good faith of the authorities at Washington, though none the less determined to fight for the company's rights.

A large percentage of the failures of American irrigation companies has been due to the high rate of interest they have had to pay for capital for construction works. The success of the Rio Grande Company would have inspired confidence among European investors, and other American irrigation undertakings would have benefited proportionately. As matters now stand American irrigation securities are absolutely unsalable abroad.

So much for the patriotic efforts of General Anson Mills.

NATHAN G. BOYD, M. D.

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs. Also sketches or plans of convenient and commodious barns, hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us improve the appearance of THE AGE?

SOME WESTERN GRASSES.

The native grasses of the west are valuable forage plants, sustaining great herds of horses, cattle and sheep, throughout the dry summers and cold winters, and making good growth upon the most arid lands. Many short tuft grasses appear with the early spring rains, or immediately after the snow disappears from the mountain forests, and by July are perfectly dry. Other more hardy varieties start with the spring rains and continue growing, as the summer showers supply the necessary moisture, until fall, when they seem to take a new lease on life and get their full growth and mature seeds. The Buffalo grass, prairie June grass, sheep fescue, blue grass and the regular, never-failing bunch grass are among the list of several hundred distinct species especially useful on mountain ranges and upland mesas. These grasses supply summer range on the mountain slopes and summits, and winter feed in the lower valleys, for herds that are annually shipped direct to the eastern markets without any additional feeding.

In some sections of the Northwest the warm Chinook winds carry away the snow a few hours after it falls, thereby enabling the horses, cattle and sheep to feed upon the succulent grasses, without other food or shelter, and come out in the spring fat and sleek. When the Mormons settled some of the coldest valleys of Utah, they had no feed for their animals, and were compelled to shovel away the snow, sometimes three feet in depth, to give the cattle

and horses the necessary native food. In some instances the horns of cattle were sharpened by filing in order to help them in cutting through the crust of frozen snow to the brown grass. Indians understand the nutritive value of the several grasses and native plants and are continually moving about to find the particular feed adapted to each season. They esteem the white sage, greasewood, Montana pea and other similar arid bushes and plants as most valuable forage, even better than grasses for sheep ranges.

The wild hay, of which many thousand tons are harvested every season throughout the western states, possesses feeding virtues not found in the cultivated clovers, alfalfa or timothy. Farmers frequently plow their wild meadows to increase the yield and make new sod or a better plan for irrigation. The grasses usually found in these meadows, or bottoms, are wheat grass, blue stem, rushes, red top, foxtail, brome grass and many others suitable to excessive irrigation. After irrigating the cultivated area in the uplands or higher fields, the surplus water of spring and summer goes upon the meadow and soaks into the marshy peat, forming great bogs and making luxurious growth of the mixture, which is cut for hay. The more water applied during the spring and early summer the greater yield of hay in July and August. In most valleys the underflow or surplus of surface irrigation in the uplands, will flood the meadows about September, hence hay must be made while the sun shines on dry land.

Some readers ask, "Can this meadow grass be killed and the land cultivated?" That depends upon the surrounding conditions. As a general rule water will not destroy any of the grasses; though their natures may be desert, they flourish under water. The best and in fact only plan to get rid of the wild grasses, rushes and willows of these native meadows is to thoroughly drain the land, and when in proper condition plow and cultivate. Annual inroads are made upon the natural swamps and hay fields of the west, where land is valuable, by systematic and thorough drainage, followed by clear cultivation. The land is suited to growing oats, potatoes, onions and similar crops, varying with altitude and local conditions. Drains may be mere deep channels, cut at proper angles through the meadows, with sufficient fall to carry the water to some stream, or regular tiling may be put in upon proper levels, leading to a reservoir or stream.

During the past season several experiments have been made with the Russian brome grass, and in every instance so far as I have heard, the plant has given perfect satisfaction. This is an arid grass which thrives well under irrigation and cultivation and will no doubt take a very prominent place among the forage plants of the western states. The old Idaho coffee pea, advertised so extensively as a novelty is certainly an excellent forage plant, of which I shall say more in a future issue of the AGE. I tried it this season and found it more than ever the most enthusiastic advertiser claimed for it as a feeding plant for farm animals and poultry. This is nothing more than the wild pea found in Idaho and Montana, so much relished by stock, but it is one of the valuable additions to western grasses and plants that cannot be overlooked when speaking of the ranges of the arid region.

JOEL SHOMAKER.

The future is what we hoped the past would be but wasn't.

HINTS TO CATTLE RAISERS.

The Chicago *Inter Ocean* recently contained an interview with R. W. Tansill, of Eddy, N. M., in which there are some valuable hints for cattle raisers. Mr. Tansill says he received his information on the subject from James A. Lockhart, vice-president and general manager of the Alfalfa Land and Cattle Company, of Colorado Springs, and that he wishes every cattle raiser on irrigated land to have the benefit of it.

"This, then, is Mr. Lockhart's plan," said Mr. Tansill: "He takes calves at, say 6 months old and puts them in fenced lots and feeds them on alfalfa, supplemented by one pound of fine-ground cornmeal per day, fed dry from troughs increasing the cornmeal as winter approaches to two pounds per head per day. As soon as the calves become used to the feed he dehorn them. Five men can dehorn from 600 to 800 head in a day. In the spring he turns them on native grass pasture or range. In the fall he takes them up and puts them in feed lots again, giving them now a full feed of corn, for, say, six months, with other solid food. At from 18 months to 2 years they are ready for the market, will weigh about 1,100 pounds and command top prices.

The secret of the great advantage in this plan is that by taking the calves from the cows and feeding them as described the stomach is rapidly distended instead of being allowed to become contracted and rigid, which must of necessity result if the young animals are allowed to run on the range after weaning. For when the stomach is permanently contracted by eating dry food and range grass directly after the calf has been weaned it is impossible to obtain satisfactory results from full feeding later on. These facts will account for the poor results obtained from the full feeding of stock which has been allowed to run on range until 3 or 4 years of age.

Another advantage should be noted. By taking calves early from the cows the

latter are enabled to recuperate flesh so as to be in better condition to go through the winter. Another advantage is the saving the cost of branding."

Mr. Tansill was in Chicago on business connected with the building of the Pecos Valley railroad, the construction of which will open a direct route from Pecos Valley, which Mr. Tansil claims is the finest stock-breeding section in the United States, to Chicago and the east.

THE DESPISED SALT GRASS.

A sheep raiser, who is located near Grand Falls, Texas, speaks very favorably of the despised salt grass as food for sheep. The gentleman, Mr. W. N. Fowler by name, has about 26,000 head of sheep and during the past summer he did not lose a single sheep on account of short pasturage, while sheep-men living some fifty miles away, where the salt grass was not abundant, lost half their flocks.

The salt grass is about the first green thing to appear in the spring and grows very luxuriantly without the aid of rainfall or irrigation, so that even in a prolonged drouth those who live in the salt grass region are sure of having pasture for their sheep.

Salt grass is only one of many grasses that are of inestimable value to cattle and sheep raisers, for there is no other country that has so large a number of useful grasses and native forage plants as our own. According to the "Year-Book of the Department of Agriculture", there are 60 native species of clover, 70 blue grasses, 25 gramas and curly mesquite grasses, valuable for sheep and cattle pasturage, 90 lupines, 20 wild beans, 40 vetches, 20 kinds of wild rye, 30 kinds of brome grasses, and meadow, pasture, woodland and swamp grasses without number.

LIKE THE FAMOUS BEANSTALK.

An instance of the rapid growth of vegetation in southern Arizona is to be found

in the corn and sorghum planted on the Rillito by J. D. Andrew. Before the late rains came it was about ten inches high and was kept alive by cultivation, but is now higher than a man's head. When the rains came it took a new start in life and grew from six to ten inches in each twenty-four hours. The fear now is that it will run largely to stalk. The sorghum grew almost as rapidly as the corn, and is now in blossom, with the promise of a large and profitable crop. Of the two he has about forty-five acres wholly dependent on the summer rains for making a crop.—*Arizona Daily Gazette*.

IMPORTANT IMPROVEMENTS.

P. N. Myers, general manager of the Hemet, (Cal.) water system, reports that the following improvements are to be made in the Hemet system before the next irrigation system opens: The flume and ditch will be covered to keep out all impurities, for the purpose of improving the general quantity of the water, also an independent pipe line, will be run from the crosscut southeast of Florida to the southwest side of Park Hill, where a receiving reservoir will be built and large covered filters put in at an elevation of 150 feet above Hemet, said filter to have a capacity of 200,000 gallons per day. This filtered water will be run through an independent pipe line to the patrons of the Lake Hemet Water company for domestic purposes. The company will also replace their twenty-seven sections of flume, the flume to be 36x54 and have a capacity of 4000 miners' inches. The diversion dam will also be repaired and improved. The above repairs will take about fifty carloads of lumber, and will cost \$20,000. When completed, the Lake Hemet Water company will have the most perfect water system in California.

There is more exertion used in running 200 yards than in riding a bicycle four miles.

PULSE OF THE IRRIGATION INDUSTRY.

THE SEVENTH ANNUAL CONGRESS.

The seventh annual session was held at Cheyenne, Wyo., Sept. 1, 2, and 3. Gov. Richards, who delivered the address of welcome, reviewed the agricultural history of Wyoming in a manner that proved his thorough knowledge of the subject. He then gave an outline of what the Congress might do for the state.

Ex-Senator Carey, of Wyoming, president of the Congress, gave an opening address which has been widely quoted by western publications, and was a masterly review of the work of the Congress in the past. Said he:

"The sessions of the National Irrigation Congress have left behind them lasting impressions and far-reaching benefits. The questions discussed and the resolutions adopted from time to time have brought prominently before the people of the United States the arid and sub-arid portions of the country, their present condition, and what is required to transform sections now wholly or partly sterile and unsightly into those of productiveness and beauty. The sessions held and the commissioners heretofore appointed have not accomplished all that could be desired; yet a great deal has been done. If we examine the statutes of the United States and of several states interested, we will find that much useful legislation has been secured. The files of the two houses of Congress best tell of the interest now manifested in the question which directly concerns the arid states and territories. Various bills have been introduced and considered which directly apply to the trans-Missouri country, many of which possessed significant merit. The newspapers and magazines now give the subject discussed in the irrigation convention space and criticism. These sessions bring together scientists, skilled engineers, law-makers, practical business men, capitalists, and the every day farmer and irrigator. The delegates each take a significant part in the deliberations, and each is so necessary to the other that it is difficult to determine which of the different professions and trades becomes the most important factor. Each gives the other

the benefit of his experience and explains his theories, thereby helping to build up a sound public sentiment. While there has been much to discourage, yet that which has been realized in the way of legislation should be a sufficient incentive for us to continue our efforts."

Irrigation, as the speaker further pointed out, was not a doubtful possibility, but a certainty. Experiments have demonstrated repeatedly what may be accomplished by its use, and therefore asking the aid of the government in constructing reservoirs to hold water for irrigating the arid lands is not asking it to embark in any theoretical scheme unproved by practice.

"Irrigation for the most part," said President Carey, "is still primitive. In many of the states, only from the small streams have the waters been diverted; the great streams have only been touched."

In conclusion he said: "We hear of failures; many will say that in their endeavors they have lost their capital and labor. This could not be otherwise, for all that has been attempted in the way of irrigation work has not been completed, nor has all been done satisfactorily and successfully. In great undertakings there have always been some bitter disappointment and failures. This will occur in the future as it has in the past. All railroad building has not brought large returns. The great canals of half a century ago for transportation purposes have been largely abandoned. Why should we expect all irrigation enterprises from their very inception to be successful? We, however, say that irrigation works properly located and well constructed are always a success, for do they not, when operated, turn a desert into a garden and supplant barrenness with fertility, and, as if by magic, change the parched and thirsty plains into harvest fields producing profitable crops? These changes

showing here the desert and there a fertile field are ever a delight to the human eye."

Col. Nettleton, of Colorado, one of the prominent men in the irrigation movement, read a statistical paper on "The Success and Failures of Canal Building and the Causes Thereof." He divided irrigation enterprises into three heads, corporation, co-operation and colony, describing the motives and methods of each and gave figures to prove that irrigation enterprises in Colorado were not failures.

State Engineer Mead, of Wyoming, discussed "The Obstacles to Settlement in the Arid Region and the Best Means of Overcoming Them." In the debate upon this topic Mr. Mead graphically portrayed obstacles to settlement as experience had shown them. Capital was needed to make settlement by the poor man possible and he believed that an easy way to get it was to cede the grazing lands to the state, and let them lease them, thus securing four million dollars capital to promote irrigation. This recommendation of Mr. Mead's received the endorsement of the Congress. Mr. Mead is preparing a bill which he hopes will pass the National Congress, which will provide that for every acre of land taken up under a canal sixteen acres of arid land adjoining thereto will be leased at a nominal rental, say 1 cent per acre. He estimates that if this can be accomplished, even at this rental, it will produce a revenue of about \$4,000,000 per year. This in turn he proposes shall be expended in building storage reservoirs and further reclaiming our vast arid region. This projected bill is one of the most important steps that has yet been taken for the reclamation of the arid land of America, and if it can be carried out it will be a practical solution of this important question.

Another recommendation that received the endorsement of the Congress was that of Col. Chittenden in regard to storage reservoirs. Col. Chittenden was on duty

at Camp Wheeler, Huntsville, Ala., but a very interesting paper from him was read, entitled "The Construction of Storage Reservoirs Under National Supervision." The conclusions he arrived at were that one-fourth to three-fourths of the water of streams must be held back in storage reservoirs, and that the cost will compel the general Government to undertake the enterprise. An estimate of the cost of systems examined in Wyoming and Colorado show the necessary annual expenditures to be moderate. His work included plans to enable Congress to make intelligent appropriations.

In his address on what Congress is doing in aid of irrigation, Senator F. E. Warren confessed at the start that a discussion of what Congress had not done in this line, would offer a larger field of discussion. The first evidence of interest given by Congress in the arid land problem was the desert land law; repressive legislation followed, but during the past five years a marked change for the better has occurred. The Carey act, with its subsequent modifications, was a step in the right direction, and the interest shown by Congress in investigation of reservoir sites, etc., proves that progress is being made.

A great number of other valuable papers were read and discussed, but space forbids even a mention of them.

The committee appointed by the Lincoln Congress reported that it was successful in framing a bill that met with the approval of the House Committee.

Officers were elected and executive committee named, the state of Montana was selected as the next meeting place, and other business transacted. President Carey was re-elected to office.

The entertainment committee did its work well in providing amusement for the delegates. The opera house in which the meeting was held was very prettily decorated with the products of irrigation and a reception and ball was tendered the delegates the first night of the session.

THE GRAZING LAND PROBLEM.

It is a fact generally conceded that the grazing lands of the Northwest have been overstocked and that there is a marked decrease in their stock-raising capacity. The lack of water has been a potent factor in the destruction of the grasses, as the cattle have gone back and forth in search of water until the forage growth has been trampled out. F. Lawson-Scribner, agrostologist, suggests that this could be remedied, at least in some sections, by building reservoirs to hold the water of melting snows and rainfall, instead of allowing it to run to waste as at present. Statistics show that, while the number of large ranches are decreasing, small farms and stock ranches along streams and water courses are increasing in number. By irrigation the forage-producing capacity is increased many times, and in sections of Wyoming, where formerly only sage brush was produced, there are now, thanks to irrigation, excellent yields of oats, wheat, rye, timothy, red top, alfalfa and clover.

An article treating upon this subject appeared in the September *Forum*, under the title of "Our Public Grazing Lands," and was ably handled by the author, Frederick V. Coville. As an introduction he quotes from a Colorado paper an account of a stampede of sheep by cowboys, in which 3,800 sheep were killed and the sheep herder seriously injured. "Incidents' such as the one above described," he then says, "happen on the public lands, and are the outcome of the present public-land laws, which Congress has made and which congress alone can unmake."

The writer traces the course of the grazing industry from the time of the passing of the Homestead act in 1862, by which the settlement of public lands was extended westward and the thousands of acres of hitherto valueless land made profitable as grazing lands for cattle, to the present decadence of the cattle industry, due to the lack of forage growth. The lands have been used again and again un-

til the grasses have been eaten out or killed by other vegetation which cattle will not eat, until in some sections "large areas which were once fine grazing-land-today will not support one steer." The net loss to the state of Wyoming from 1896-1898 in capital invested in beef, cattle and sheep is about \$11,000,000.

Mr. Coville asserts it is his belief that "if the laws governing our arid lands remain unchanged, lawlessness will continue, the destruction of private property and human life will go on, the prosperity of communities will be lessened, and one of the rich resources of the nation will be wasted." To transfer the public grazing land from governmental to private ownership is a remedy advanced by many for this evil, but it has serious drawbacks,—first and greatest is that the land is apt to be monopolized by a few men, while the second and economic objection to the immediate disposal of this land is that we do not know the real value of it. "The present classification recognizes only three kinds of public lands—mineral, timber, and agricultural. Before the government can dispose of grazing-lands, it must determine which portions of the land now lumped as agricultural are really such, and which portions are fit for grazing. Especially must such areas of arid land as are capable of irrigation, and which, therefore, are really agricultural, be segregated from the areas not capable of irrigation, and be classed as grazing. It is only by the actual application of engineering and hydrographic methods that the exact location and extent of the irrigable portions of the arid lands can be ascertained; and, in the natural course of events, this would require many years. Clearly it would not be to the interest of the government to grant patents, as grazing-lands, to large areas really irrigable, and worth, therefore, five, or perhaps, twenty times as much. Furthermore, the economic conditions and the trade relations of the West in general have not yet become sufficiently well established to indicate the true value

of land. Land values have been too high at one time or place, and too low at another. It will require at least one or two more decades of successes and failures to show the real money value of our grazing-lands. We do not know whether their present estimated values are too high or too low.

It has more than once been proposed that the government should cede its land to the states in which the lands are situated. The principal reason advanced in support of this proposition is, that the public lands pay no taxes and cannot, therefore, be made to bear their proportion of the cost of state administration and improvement; the whole cost thus falling on the private property within the state. Especially is this burden felt in those states in which the area of government land is still large. During the last decade this proposition of state ownership has been before Congress in various forms. In general, it is favored by the newspapers of the grazing-states, as represented by Wyoming, for example, and is opposed by the newspapers of the agricultural states, particularly the irrigation states, represented by California. In view of the widespread distrust among the people of the west of state, as opposed to Federal, management of the public land,—a view strongly evidenced by the antagonism which the proposition of state ownership has met in Congress,—it seems to be extremely doubtful whether any effective action in this direction will ever be taken."

Since it is thought that the government must for the present retain control of these grazing lands, the remedy for existing evils must be by limiting the amount of stock to the forage capacity of the area, and after briefly touching upon the plan of a *per capita* license, and showing the objections to such a course, Mr. Coville recommends the leasing system as a solution of the problem. Each lessee would thus have a direct interest in the proper management of his tract of land. This system, the author states, is used success-

fully by the Australian government in solving the grazing-land problem, by the state of Texas and by the Northern Pacific Railroad. Thus it has been proved that the leasing system is practicable and profitable. The sum obtained should go—not to the general treasury but, to the state in which the lands are located, as many western states have expended all the money allowed therein for improvements and are yet in need of funds to carry on schools, improve roads and "particularly for popular agricultural education, and of state moneys for great irrigation enterprises—a matter of paramount importance in some states."

Mr. Coville favors a joint administration by the state and the government, in order to go away with the objections that are held by many sections against state management of the public-land system. A rancher in Oregon suggested a principle to the author, which a San Francisco lawyer, experienced in water-right contests, and the state irrigation engineer of Wyoming, modified, and the proposition finally is as follows: "Let the government retain its title to the grazing-lands, but adopt a grazing-lease system. Let the administration for each state be in the hands of a Federal officer, who shall have his headquarters within the state, attend to all leases and other business for that state, and decide all contests. The resident officers to be responsible to a central officer in Washington, who shall have the general supervision and direction of the system, be responsible for its proper management, and have the right to veto, or reverse, the decisions of the resident officers; his office to be retained during good behavior. In each state the income in excess of the cost of administration to be returned to it, to be used for specified purposes of state improvement."

BIG PIPE LINE.

There are 115 settlers in West Riverside whose water for irrigation and domestic use is conveyed to them through the Ju-

rupa and West Riverside canal. The settlers do not own this canal, but each has the right to convey a certain amount of water through it. For a number of years there has been expensive litigation between the settlers and the Stearns Rancho company, owner of the canal, and it has been extremely difficult to adjudicate the interests of the several parties.

As a solution to the many difficulties they have experienced, one of which was the frequent breaking of the canal, the settlers are planning to abandon their rights in the canal, and build a pipe line for the conveyance of the water appurtenant to their lands. It will be necessary to lay for this purpose eight miles of steel pipe, the greater part of which will be twelve inches in diameter. The proposed improvement will cost in the neighborhood of \$50,000—a sum that it will be difficult to raise at this time. The settlers are hopeful of carrying out their project, however, and it is to be hoped that success will attend all their endeavors.—*Press and Horticulturist*.

STATE NEWS.

WASHINGTON.

About 25 per cent. more fruit is being transported through Spokane over the Northern Pacific than ever before. Railway officials think this increase is due to the fact that the young orchards are beginning to bear, and hence it is a permanent gain.

ARIZONA.

Among the growing towns of Arizona may be mentioned Winslow, about fifty miles east of Flagstaff. The Santa Fe Pacific railway has made many improvements that have been essential to the growth of the town and it is now in a thriving condition, it being the eastern end of the mountain division. Water, as in other apparently barren sections of Arizona, is the great problem with the settlers in this vicinity and important irrigation enterprises are being promoted. The soil is rich and productive of every kind of fruit

and vegetable, where nature has been kind and artificial means of producing moisture can be employed. There are several thriving ranches near Winslow, and the cattlemen furnish their quota of support to a thriving community.

In addition to three churches and a public school, Winslow has an anti-bachelor organization, and the man who has neither a wife nor a "girl back east" for whom he intends sending as soon as he gets a house built, is a social outlaw.

Mr. Shelby M. Cullom, deputy collector of internal revenue, returned recently from an official visit to Nogales, Ariz. He says that property owners along the international boundary are engaged in moving their buildings from the sixty-foot strip which the government decided to throw open for four miles, two on each side of the town, for the purpose of removing some of the facilities for smuggling and for the further reason that a purely mathematical line, one having length, but neither breadth nor thickness, is too imaginary. Persons occupying this condemned territory have lately received notice to vacate, and all but two are acting upon the notice. One of these two is Captain John T. Brickwood, whose saloon abuts on the republic of Mexico. Some travelers in describing Brickwood's saloon have stated that it is built across the line and that there is a mark on the bar indicating the international boundary; that on the south side are kept Mexican cigars and French and other foreign drinks, which if imported into this country would cost a great deal more than they do in this so-called free zone. It has been stated that whenever Captain Brickwood's customers want any of these things they are served for them on the south side of the international line running across the bar.

As a matter of fact the saloon lies wholly within the United States, but the southern end of it is built against the Mexican line. A porch on that side is wholly in Mexico.

Only three states now surpass Missouri in the production of distilled liquors. Illinois is first, New York, second, and Kentucky third.

ODDS AND ENDS.

THE SAFETY OF RAILWAY TRAVEL.

Last year on American railways one passenger was killed in accidents out of every 2,827,474 passengers carried. That is to say, that you can take a train 2,827,474 times before, on the law of averages, your turn comes to be killed. You will have to travel 72,093,963 miles on the cars before that turn comes, and 4,541,945 miles before you are injured. If you travel 20 miles every day for 300 days in the year, you can keep on at it for 758 years before your turn comes to be hurt. If there had been railways when our Savior was born and you had begun to travel on the first day of the year A. D. 1, and had traveled 100 miles in every day of every month of every year since then, you would still have (in this year 1898) nearly three million miles yet to travel before your turn came to be killed.

The Hon. Frank A. Vanderlip, Assistant Secretary of the Treasury, will have in *McClure's Magazine* for October an article on the "Cost of the War." There has been a great deal of speculation and talk on this subject by people who were in no position to come at the facts; but Mr. Vanderlip must have them all right under his hand, and his article, therefore, cannot fail to be read with eager interest.

Mark Twain is the next famous person to be "anecdotalized" by *The Ladies' Home Journal*, and the Humorist's closest friends have sent to the magazine for its next number some twenty odd stories about him, none of which have ever been printed. They are, of course, of the droll sort, but not more funny than the "snapshot" pictures of Mark which his friends have also loaned the magazine. These, too, have never been printed.

Mr. Davis handles the Santiago campaign without gloves in his article on "The Battle of San Juan," in the October *Scribner's*. He says, regarding the part played by General Shafter: "The untinking answer which is invariably made to every criti-

cism on General Shafter is that, after all, he was justified in the end, for he did succeed; he was sent to Cuba to take Santiago, and he took Santiago. He did not take Santiago. His troops, without the aid they should have received from him of proper reconaissance and sufficient artillery, devotedly sacrificed themselves and took the hills above Santiago with their bare hands, and it was Admiral Cervera who, in withdrawing his guns which covered the city, made a present of it to the American army."

The plan to make the Columbia and Snake rivers navigable to the sea has been proposed and is enthusiastically endorsed by many western people. Mr. Noltner, an Oregon editor says: "It is a matter of the utmost importance, and no man should be elected to either branch of congress who is not openly and enthusiastically in favor of this improvement. It is the regulating power of inland transportation, and is demanded in the interest of all classes of producers."

One of the newspapers, in commenting upon the assassination of the Empress of Austria, remarked that "only a crazy anarchist could see how the stabbing of a woman could benefit the common people."

Reports from Elk City, Io., near the Bear Ridge mining town, state that a miner has made a valuable acquisition. It is a free milling proposition and runs from \$50 to \$500 to the ton. Work on the claim will be pushed during the fall and winter. Elk City is coming to the front as a mining section.

We wish to call attention to the ad. of B. F. Stuart, which appears on another page of this issue. Mr. Stuart deals in the Stuart Earth Grader, a machine that is invaluable to orchardists, alfalfa growers and irrigators in general. See ad. on another page.

We wish to state, to prevent any misunderstanding, that the work on "Mystery and Mastery of Irrigation," advertised on another page, is in galley proof form.



A SCENE IN THE VALLEY OF THE RIO GRANDE.

THE IRRIGATION AGE.

VOL. XIII.

CHICAGO, NOVEMBER, 1898.

NO. 2.

THE PROGRESS OF WESTERN AMERICA.

Trouble at Home.

Those who oppose territorial expansion for this country bring forward to support their arguments the late Indian outbreak in Minnesota and more especially the war of the mining operatives in Illinois, as proof that the United States ought not to extend her territory so long as complete harmony cannot be sustained within her present boundaries. The Indian outbreak which occurred last month, in which Maj. Melville C. Wilkinson, U. S. A., was killed, was the outcome of a long-continued injustice to the Indians in regard to the selling of their timber. After the expenses of selling the timber was deducted the proceeds were to be distributed among the Indians owing the timber land, but the men who had charge of the sales took good care that there should be no surplus after the "expenses" were paid. The outbreak was due to the dishonesty of some of the political agents, and for a short time it was feared that a general uprising of the 7,000 or 8,000 Indians in that section would occur.

The war at Virden, Ill., Oct. 12, between the colored and white miners was still more serious, eleven lives being lost and twenty-three persons being injured. This was not so much a protest against negro labor, as some claim, but a protest against any labor being brought from other states to take the places of the strikers. Gov. Tanner did not improve affairs by refusing to send troops, though probably the sympathy of the majority of the people is with the strikers, as the history of the treatment of the coal miners of Illinois is not a

subject of which the state can be proud. Because these disturbances have occurred does not prove that we cannot contend with problems of Cuba or the Philippines.

The Investigating Board.

In speaking of the inquiry now pending of the investigating board the *Review of Reviews* says: "The methods of an investigating committee ought not to be those of a judicial tribunal. In the administration of justice it is assumed that things are right until they are proved to be wrong. In the investigation of charges and complaints, on the other hand, it is the usual plan to assume that there is a good deal of foundation for the charges, and to give real encouragement to those who have grievances so that they may not be frightened or discouraged in telling what they know. * * * Meanwhile we have liberty of the press in this country, and the public will conduct its own investigation. Mistakes of the past cannot be undone, but the country has a right to expect that such mistakes will not be repeated in the future."

A Division of Irrigation.

We wish to emphasize one point in Mr. Maxwell's article in this issue, and that is the proposition to have a "Division of Irrigation in the Department of Agriculture." This meets our hearty approval and endorsement. The two are so closely allied that irrigation is as much a part of the agricultural department as is forestry, etc. There is a crying need for a division of this kind to aid the dweller in the arid west to solve the many problems which present themselves to him: which would supply him with bulletins and literature

on irrigation experiments. Farmers are beginning to realize the benefits of irrigation and have a desire to try the system but do not know just how to go about it. There should be some way provided by which the small farmer may obtain information on this subject as easily as he now can regarding fruit pests, fertilizers, etc.

"I Will" Chicago is a constant surprise
a Fitting to other cities. The United
Motto.

States regards her with the astonishment the old hen felt when her duckling took to the water. The first surprise was that sane men should attempt to build a city upon the swamps of the Chicago river. But despite the prophecies of disastrous failure the city was built and prospered. After the fire of 1871, when pessimistic people said "the city will never be rebuilt," Chicago rose from her ashes with a rapidity that was surprising. She captured the World's Fair and again "astonished the natives." So well known is her propensity for "getting there" that it occasioned but little wonder when she was the first city to hold a peace jubilee.

Such a dismal period of rain and slush as the jubilee week proved to be might well daunt the projectors. Like a naughty child, who when company is present absolutely refuses to "show off" but sits in sulky silence, Chicago put on her blackest frown and showed strangers what she could do in the way of weather, causing them to wonder how anyone who was able to get away could live in such a dirty, rainy, foggy, muddy place.

But despite the unfavorable circumstances Chicago conquered fate and held her jubilee. The crowd that gathered on Wednesday, Oct. 19, to witness the parade, was in itself worth seeing. Looking down from high buildings you seemed to see in the streets below a moving mass—people packed like sardines in a box. Everything orderly, every one good-natured; each one accepting the inevitable jostling and crowding as merely a part of the day's celebration. Even the man who fell in the street too drunk to regain his feet, had a contented look on his face as if he did not mind the inconvenience of lying on his back in the mud, but was only thankful for space in which to fall.

To say that President McKinley made a

good impression and won many friends fails to express it. And though perhaps, in view of the recent failure of the peace commissioners to come to any definite agreement, the celebration was a little premature, the good that it has done in introducing the President personally to the people and the desire evinced by all—regardless of party—to support the policy of the administration, is worth all the expense the jubilee celebration entailed.

**Bismarck's
Diary.**

At no time when thinking of a great man deceased are we so prone to agree with Shakespeare that "The evil men do lives after them; the good is often interred with their bones," than when we hear that his diary is to be published—his inmost thoughts, his hidden weaknesses, his secret loves and hates, given to the public. Bismarck made many enemies during his long life, and the recent publication of his diary will not tend to decrease the hard feeling held by many, especially by the English nation, as the entries prove he had no love for that country. A London newspaper, in its criticism of the work, says it proves Bismarck to have been as arrogant and brutal as his worst enemies declared him to be. The man who published the diary is Dr. Moritz Busch, sometimes described as Bismarck's Boswell, and though it is claimed that he had Bismarck's sanction, it would seem that the best and kindest thing Dr. Busch could have done would have been to allow the diary to remain *only* a diary. The efforts the ex-chancellor's family are making to justify his treatment of his enemies and to avenge his insults, will be much hampered by this book, which most Germans condemn as showing want of tact on the part of Busch and which is a mere jumble of unimportant remarks, which teach us nothing new, yet cause a great deal of bad feeling." A Glasgow paper says of the book: " * * * Dr. Busch has so fully drawn the screen from before this great German idol that we have no difficulty in seeing that the feet are clay. And such clay!"

When a man is dead—beyond the reach of reproach, when he can no longer defend himself against the criticisms made by his enemies, is it not better to let the "dead past bury its dead?"

**This Month
and Next.**

We present in this issue a portrait of Geo. H. Maxwell, of San Francisco, Cal., Editor of the *National Advocate* and the *California Advocate*, and an earnest and energetic worker in the irrigation movement. We hope, later on, to present a sketch of Mr. Maxwell, whose able contributions to the AGE have made him known to its readers.

Next month we will give a portrait and biographical sketch of Joel Shomaker, so long a valued contributor to this journal, and also one (we hope) of T. S. Van Dyke, who may be termed the "irrigator's favorite," as his writings on irrigation subjects, his dry humor and thorough knowledge of the art of irrigation, have made his name well known throughout the west.

**A New
Contributor.**

We have much pleasure in directing the attention of our readers to an interesting and instructive article in this issue of the AGE under the "Diversified Farm" department entitled "Land and Products—An Exhaustive Analysis."

The article is the more interesting and the information the more valuable because the writer, Wallace Harrington, is a man who is not only master of the subject treated, but is also a man thoroughly reliable for truth and integrity of purpose.

Mr. Harrington presents an array of facts and figures that shows the cattle business in America to be of enormous proportions, and yet conditions prove that large as it now is, it will continue to increase from year to year as new markets are opened. The daily service of dressed beef to Great Britain mentioned by him will absorb hundreds of tons every day, and when this daily service is extended to all Europe the demand will increase. But raising and marketing cattle, like any other lucrative business, must be understood in order to be successful. A mere novice in the trade will not do. A man must understand and be a good judge of the different breeds of cattle, how to manage them and put them on the market.

This article is Mr. Harrington's introduction to AGE readers and we hope to enable them to continue his acquaintance by presenting other articles from him in future issues, feeling assured that they will prove as interesting as this one.

**The
Nicaragua
Canal.**

On October 21 the Nicaraguan Commission decided that the concessions granted to the Maritime Canal Company of Nicaragua expires October 20, 1899. The Nicaragua canal has been talked of for years. Investigations have been repeatedly made for the purpose of determining whether its construction were possible at a reasonable expense, and though many disbelieved and still disbelieve in the feasibility of the plan, its possibility is now quite generally conceded. Many things apparently impossible have been accomplished and why not this?

The present Canal Commission consists of three men, and though their official report has not yet been presented to Congress, all of them have stated, since their return from Nicaragua, that the undertaking is entirely feasible. Their opinions regarding the expense varies from \$140,000,000, Gen. Hains' estimate, to \$90,000,000, Prof. Haupt's estimate. Admiral Walker, the other member of the Commission, thinks the construction would not exceed \$125,000,000. The engineers of the company claim that a canal, with thirty feet of water, and locks large enough to pass the largest battleships, can be constructed for a sum not to exceed \$100,000,000. This may seem like a large amount but since the "Oregon" made its famous voyage around Cape Horn, there are few who cannot see the desirability and value of such a canal.

Many ask why this canal is not constructed by private individuals; why make a government project of it. The answer to this is that since the Panama episode, where so many millions were squandered and stolen, capital has fought shy of similar enterprises backed by private companies.

Warner Miller, in the November *Forum*, answers the other question that probably arises, as to why, if this canal be possible, the government has not constructed it. He says that it is a hard matter to convince the majority of the people that such a canal is either feasible of construction or that it would be of any great benefit if built, and the government is loath to embark in such a stupendous enterprise without the pressure of public demands. A

demand will probably now be made, as the recent war has shown the disadvantage of our disconnected coast line, while the friendly relations now existing with England will do away with the idea that there would be any objection from outsiders to the construction of the canal. England would be more nearly concerned than any other country and satisfactory arrangements could undoubtedly be made with her. Ex-Senator Miller claims that the one great drawback to government action being taken in this matter in the past has been the influence of the great railway corporations. The trans-continental railway capitalists have had the idea that a canal would injure their trade to a large extent, and so have opposed it and by a system of lobbying, peculiarly their own, have, for the past ten years, prevented any bill favorable to the construction of the Nicaragua Canal from being acted upon at a joint session of House and Senate.

Farmers' National Congress. Beginning Dec. 6, 1898, the National Farmers' National Congress will hold its eighteenth annual session at Fort Worth, Texas, lasting until Dec. 14. The program is made up of so many interesting features that it is hard to decide which will prove of the most value. On the first day, in addition to the usual addresses of welcome, the responses, and the annual address of the president of the Congress, Hon. W. D. Hoard, those attending will have the pleasure of listening to Hon. James Wilson, Secretary Agriculture, U. S., on the subject of "Extension of Foreign Markets for Farm Products." Booker T. Washington, President Industrial Institute, Tuskegee, Ala., will address the meeting on "Industrial Education for the Negro." Among the numerous other topics taken up by men well qualified to speak on them will be "The Beet Sugar Industry," by Hon. W. G. Whitmore, Nebraska; "Agriculture in the Schools," by Prof. C. C. James, Assistant Secretary Agriculture Ontario, Canada; "Railway Discrimination," "The Cotton Interests," "Trusts and Monopolies," etc, etc.

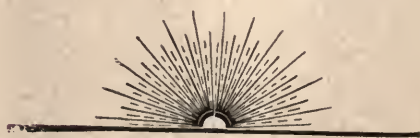
Fort Worth is making every effort to have a successful and enjoyable meeting; railway fares will be reduced, hotel rates will be moderate, and the delegates will be

given a splendid opportunity to see the state of Texas, as the business men of Fort Worth have arranged to give a free excursion to all delegates from other states, the excursion to last about four days and cover 1,000 miles. Hotel rates will be low, and the fare to delegates will be free. Low transportation rates will be made to those not delegates.

At the last meeting of the Congress a resolution was passed by which the voting membership of the Congress was to be as follows: "A member from each congressional district and two at large, to be appointed by the governor of each state (and such governors are requested to appoint practical farmers as such delegates). That each agricultural college and experimental station be entitled to a delegate, and that each national and state society or organization, created and maintained for the fostering of any agricultural interests in the Western Continent, shall be entitled to a delegate; further, that these organizations, societies, etc., shall supply a certified statement of the existence of said organization."

The executive committee of the Congress has decided that where it is not possible or advisable to have a meeting of any national or state society or organization, named in the resolution, to select a delegate to the Congress; that the president of the society or organization name the delegate. There is practically no limit to the number of delegates that may be appointed to cast the votes to which organizations are entitled in Farmers' National Congress and it is hoped, therefore, that delegations will be large.

The Index to this number will be found in the back part of the journal instead of the front, as formerly.



IRRIGATION IN WYOMING.

JOEL SHOMAKER.

Wyoming is the fourth largest state in the Union. It comprises a vast mountainous water-gathering area extending 420 miles east and west and 300 miles north and south. Within the borders of this division are nearly 63,000,000 acres of agricultural, grazing and timber lands. The mean altitude of the state is about 6,500 feet, but many mountain peaks reach 11,000 feet and hold perpetual snowbanks for the immense water supply. Numerous large rivers and tributary streams flow out from the watershed, estimated at 22,000,000 acres, and contribute to the high waters of the Missouri on the north, Platte on the east, Colorado on the south and Snake on the west. The irrigated area is less than 500,000 acres, hence the volume of water originating in the fountains of Wyoming, if properly impounded would be sufficient to reclaim one hundred times the present cultivated fields.

A territorial organization was formed July 25, 1868, and the present state admitted July 10, 1890. The census returns for 1890 gave a population of 60,705, of whom 922 were Chinese and Indians. The same enumeration gave 3,125 actual farm owners in the state, and an average of 120 acres to the farm. The average first cost of water right is \$3.62 an acre, annual maintenance fee 50 cents an acre and clearing and preparing for cultivation \$8.23 an acre. Appropriations of water have been made from over 600 streams and most of the farming is confined to the higher mountain valleys, where canals are easily and cheaply built and the flow of streams can be conveniently tapped. Wheat, oats, potatoes and hay are the chief products and the yield is equal to any similar altitude throughout the irrigated west. An estimate given by one of the leading farmers places the yield per acre at the following figures: Oats, 60; wheat, 50; potatoes, 600 bushels, alfalfa, two good crops and wild hay four tons per acre.

Wyoming contains twelve county divisions, each being more or less irrigated by small farm ditches taken from the mountain creeks or plains streams. There are a few flowing wells along the lines of railway, but the principal source of irrigation is the individual or farmer's ditch. The water is under state control through the provisions of a district system authorized by an act of the first state legislature. This law I think is the most perfect of any ever framed in the irrigated west, and it certainly prevents much waste, litigation and damage so frequent in some sections. A state engineer and board of control regulates all appropriations without resorting to courts, and no appropriator is allowed more than he can put to a beneficial use. The maximum being set to a limitation of one second foot for 70 acres

no man can object to the volume allowed for irrigating an acre. All water is properly measured and evenly distributed by the use of weirs and headgates, and the prior appropriations hold all right and title to the natural flow until it has been increased by reservoirs or other means.

In 1897 Wyoming produced 477,075 bushels of wheat, of which 76,332 bushels were shipped out of the county where grown. The oat crop for the same year was 479,255 bushels, there being a surplus of 14,378 bushels. The hay crop reaches 275,000 tons annually and the potato yield is about 200,000 bushels each year. Local demands usually hold up the prices of farm products above the general market quotations. In 1897 the average price for oats was 35 cents a bushel, for wheat 70 cents, corn 50 cents per bushel and hay \$6.00 per ton. Much of the agricultural production finds a purely local market because of the railroads being so far from the farming valleys. The State has about 1,200 miles of railroad, or one mile to every 175 in population, but the chief line—the Union Pacific—crosses the plains and does not touch the best farming districts. The other lines reach a portion of the agricultural lands and assist in marketing the surplus farm products.

Grazing of sheep and cattle is the chief industry of Wyoming and gradually the farmers are beginning to realize the importance of controlling this source of revenue by making it a part of the legitimate farm productions. The time has been when rangers and farmers were enemies and the two occupations were distinct, but with the era of small farms, and the necessity for winter feeding of range stock, the farmer has come out victorious, and every man owning sheep or cattle will soon become a farmer, and take an interest in developing the agricultural resources, of which stockraising is only one of the legitimate branches. There are probably two million sheep owned in the state, and the wool clip averages $8\frac{1}{2}$ pounds, which with an increase of at least one-third of the original bands every year contributes an immense sum to the farming communities. The range cattle owned in Wyoming number probably three quarters of a million and constitute the most valuable of all farm products shipped out of the state.

Albany county in southeastern Wyoming is chiefly a stockraising district, fully 95 per cent of the total farm area being devoted to growing forage plants. The Laramie plains are well watered on the west and good crops of alfalfa, wheat, oats, potatoes and wild hay are grown. The chief difficulty experienced in irrigating and farming this section has been the disregard of cattlemen for the rights and privileges of settlers and consequent destruction of crops by bands of stock not properly guarded. This is true of many other sections of the West, and colonists have much trouble in establishing homes where sheep and cattle ranging, as a transient industry, is practiced,

and the business is separate from farming. Carbon county in the southern part of the state contains many good farms and nice homes. The farm products are all sold on the home market. Ditches are small and of the individual character. The tillable land is at an altitude of about 7,000 feet and the cereals, grasses and hardy vegetables constitute the crops.

Converse county lies in the center of the eastern tier of counties, at an altitude of about 5000 feet and is a stock raising section. Water wheels are used for raising from the Platte, and with the aid of small creeks several ranches are irrigated chiefly for hay. Crook county is in the northeast and contains a few farms at an elevation of 4000 to 5,000 feet, where cereals and grasses grow profusely. Some good crops are reported to have been grown without irrigation but ditches insure harvests and the farmers have small individual canals for each ranch. Fremont county comprises a large area in the western part of the state and is pretty well watered. The same objection to general farming applies here as in nearly all other counties, in the lack of anything but a local market on account of distance from the railroad. Johnson county in the northern portion of the state has several irrigated farms and agriculture has been developed much in the past few years. Some successful attempts at individual reservoirs are reported from this county. Laramie county lies in the southeast and is well watered by several streams. The valleys range about 6,000 feet in altitude and are best adapted to stockraising and general ranching in which the people are successful.

Natrona county lies east of the center of the state and is crossed by the Platte river. The elevation is over 6,000 feet and hay is the principal crop. Sheridan county is situated in the north-center of the state and has some well developed farms. Sweetwater county in the southern part is practically a plain section containing few farms and not many irrigating ditches. Uinta county on the west rises up to an elevation of about 7,000 feet, and contains many hay ranches. Weston county in the eastern part is a plains division containing few farms. The dozen county divisions are practically the same as to altitude, water supply and general aridity. The rainfall is not sufficient to produce crops and the canals are nearly all of the individual ditch character. Wyoming presents an inviting field to the general farmer who will utilize his hay and grain in raising sheep, cattle, horses and hogs. There are but little inducements for the truck farmer and fruit grower, but both occupations can be made profitable in protected valleys along the lines of railroad.

The chief cities and towns of Wyoming are Cheyenne, Laramie, Evanston, Rawlins, and Green River along the Union Pacific railroad, lead mines are operated at Evanston, Rock Springs and other points and some general mining is carried on in different sections. Good public schools are maintained everywhere that the population justifies

and the leading religious denominations are well represented by elegant church buildings and active congregations. The country being at a great elevation there are no impurities in the atmosphere and miasmatic diseases are unknown. Numerous reservoir sites may be located and many large canals could be constructed to tap the rivers. Good sites for colonies can be found in nearly every section and, by united efforts excellent homes can be erected. The opportunities for dairying, stockraising, sheep and wool growing, horse ranching and growing of general cereals and grasses are excellent and colonists seeking such locations would do well to investigate the land of Wyoming.



UNPROFITABLE IRRIGATION WORKS.

No. VI.

T. S. VAN DYKE.

Before enquiring farther into the causes of failure in so many irrigation works let us ask what is a failure?

It is generally assumed that the purpose of an incorporation and the issuance of stock is the operating of some enterprise to make a profit to be paid in dividends to the stock holders. A very good joke, this. Such is the style in some of the old foggy sections of the world and even in some of the more archaic regions of our own country. Even in our only great and glorious west a few benighted individuals, fresh from the fossiliferous formations of the east, have had the same idea and operated some companies upon it. For a gas company or city water company, and sometimes for a street railroad this is not altogether bad. But for some other companies such as those for mining and often for irrigation it is frightfully out of line with western progress. The principal object in these are more often,

To pay fat salaries to those "on the inside."

To look after the brothers-in-law, sons-in-law, nephews, etc., of those on the inside.

To form inside companies composed of the controlling interest, to buy from or make contracts with the parent company that will utilize any surplus that if paid in salaries would look too large.

To utilize, by absorption or otherwise, anything lying around loose that might be used for the purpose of paying dividends but which cannot well be disposed of in salaries, etc., without danger of a protest from some mischief maker who happened to belong to the minority of the stockholders.

For these and various other purposes to keep control of the stock and to freeze out anybody that is unduly curious about the doings of the majority or the application of the funds.

All this is not at all inconsistent with good service to the public and many companies have been run on these lines, built up good settlements and will continue to do so. Many of these have paid a good profit to those who knew how to put in their money in the right way and watch it after it was in. Some have been honestly managed on that basis. For instance the Bear Valley Irrigation Company of San Bernardino County, California, when the dam was built and water was ready for delivery issued a dividend of water certificates entitling the holder to so much water on payment of a small sum per inch per year.

These were the class of certificate lately held good by the Federal Court and are the ones upon which the water right of Redlands has always rested. The dam was built when evolving hard cash from the inner pocket was different thing from what it now is and a few men almost beggared themselves to raise the sixty thousand the dam cost. But the stockholders did it and built the dam without bonding the work. The water was as good for cash as wheat the moment the gate was opened. The certificates were issued in amount sufficient to reimburse each stockholder for what he had paid out and a profit in addition that was satisfactory all around. The certificates were sold for cash and parties got back what they had put in and good interest upon it. This transaction is not heard of. The subsequent manipulation of the stock and wrecking of the company years afterward is now charged up against irrigation works. The fact is the proposition paid and paid well. And it always would have paid, even with ballooning, if the balloonists had not had a little too much confidence in the bouying power of their gas. All calculations as to the value of the water, its selling price for spot cash, the rate of settlement under the works, the value and productive power of the land and the amount of money it would bring in every year have all surpassed the expectations of the projectors. It was one of the most successful irrigation projects ever started, and solid as the pyramid of Cheops. But it was turned bottom upward to build upon its base another pyramid to reach the stars.

In the above case every thing was not only honestly done in distributing the assets as dividends but every one had his full share and everybody was satisfied. This is not always the case and the reimbursement bears heavily on a few who are not on the inside. There are companies paying the president ten thousand dollars a year salary to do almost nothing but look wise at a perfunctory directors' meeting. As this is five per cent on nearly a quarter of a million he must have put in considerable money in order to lose anything. In most cases it is thirty to fifty percent on what he did put in and has been paid long enough to more than pay him a good profit. In the same way a superintendent in one company I know is paid two hundred and forty a month while the secretary and ditch tender at small wages do about all the work.

In other cases the water or land of the company has been distributed to some of the parties who put in the most money and have been wise enough to keep control of the stock, but not to all equally, the distribution being in the form of a sale or an option to some relative in such a way that the minority cannot easily object. Some enterprises have paid very well in this way to those who put in the most money, the others not being considered. But if a company is not operated for dividends how can it be said to be a failure because it does not pay them? The right or wrong of the matter does not affect that

question. In other cases parties have concluded that the project was better to skin than to keep and have left the bondholders in the lurch by doing it. When they take possession of the works they find the shell tolerably empty. In some cases this has been honestly done, the water being sold out too cheap or other bad contracts made in the distress in which projectors often find themselves and when it looks as if any sort of a bargain would help them out.

It is said that capital does not enquire into the causes of failure but looks only at general results. This is so far true that it is for the interest of us all that there be no failures and nothing to explain away. But it is quite as true that there is some capital that will always listen to such explanation and enquire into it. And there is a difference between an actual failure and only an apparent one. And the chances are that investigation would show the majority of failures apparent only as explained above or as in the next class of cases.

One of the best land owner's companies of Southern California owes something like six hundred thousand dollars. It pays its interest yet it is called a financial failure because it ought to be out of debt or at least diminishing its debt instead of increasing it. This company has for years paid luxurious salaries not to reimburse anybody but as a matter of pride or style, fought everything in sight on the river and paid lawyers tens of thousands. But this is far from all. It owns about four thousand acres of fine orange land and has water enough to supply it. This is land that was left over from the block out of the sale of which the water works were built and cost only some ten or fifteen dollars an acre. It was turned over to the company when the projectors made a land owner's company of it and they had made enough out of what was before sold to pay a handsome profit on their investment and time, besides the land and water they retained to cultivate in their own company, which land is now a valuable property.

These four thousand acres could have been sold during the great boom of 1886-7 for three hundred dollars an acre. It was not enough. It was "giving it away."

The year after the boom broke they could have been sold for three hundred an acre. But that was "throwing it away."

Five years after that they could have been sold for two hundred an acre. But that was "madness."

Even last year after all the hard times they could have been sold for probably one hundred and fifty, certainly for a hundred. But that would be worse yet.

Is this company a financial failure because it still owes six hundred thousand dollars, when its purpose is to furnish several thousand acres with water, which it is doing and bringing in a profit of a million or more a year and supporting a settlement of some seven thousand people in the best of style? Yet that is what the world would say, looking only at the bonded debt. It would say there is something

wrong with irrigation when such a prosperous community shows an ever increasing debt. And yet it is in every way a success.

The San Diego Land & Town Company, the owner of the Sweet-water dam, comes into the Federal Court of California and makes statements from which it would be inferred that its waterworks were a failure. I have so far avoided giving the names of companies unless their troubles were public property. But when a company airs its linen in court it makes it public property and I mention the name in this case because the irrigation system of this company is supposed to be a failure whereas I have direct personal knowledge that it is not.

This company alleges that its works cost something like a million dollars. But this includes the distribution system for a city of towering hopes and bewildering acreage that needs only six or eight feet of dog fennel in the streets to finish it off in good shape. The company had here a choice list of fine lots on which it proposed to realize from prospective tenderfeet and spread out a vast distribution system to help catch them. Granting that it was wise it was not irrigation. At Chulta Vista, which was a fine piece of property for cultivation, the plainest horse sense would have dictated confining settlement to a central line along a main aqueduct and pushing out distributaries from that as settlement called for them. But this would not suit the requirements of a boom. So expensive iron pipe strong enough to carry water to a thousand five acre tracts under a head of some eighty feet, were laid all over five thousand acres before there were any settlers, rusting out and drawing interest at the same time with no one to use them.

There was some expensive litigation that increased the cost, but all that can be rightfully charged against the irrigation works is less than six hundred thousand dollars for the dam and about seven miles of 30 inch pipe, the dam costing about two hundred and forty thousand, and the litigation something like half that. The company sold nearly twenty-five hundred acres for three hundred and fifty dollars an acre of land that without the water would not bring fifty on any market, boom or otherwise, was not worth ten for any purpose, and cost the company considerably less than five. It could have sold the whole five thousand that it piped had it not required the purchaser to build a house costing at least twenty-five hundred dollars on each five acre lot. Even with this proviso it could probably have sold the whole for two hundred and fifty an acre, and had it discovered that the boom was really over it could have sold it all for an average of two hundred an acre.

On this sale was reserved an annual payment of three dollars and a half an acre for the use of the water, with which every purchaser was content. They paid this for some eight years without objection when suddenly the company goes into the hands of a receiver who is one of the inside gentry and gets ten thousand a year or something

like it for one trip a year across the continent in a palace car to spend a few days in the vicinity of the property. Then the company comes into court and coolly ignoring the money it received for the sale of so many acres of five dollar land for three hundred and fifty an acre because it was supplied with water, also coolly ignoring the tens of thousands it received from the sale of town lots at ridiculous figures because of the water, asks the court to have the rate annual rates raised from the three and a half an acre which was the implied contract with the purchaser. It asks to have the rates raised to seven dollars an acre a year, on the ground that the three and a half does not give the seven per cent interest on the cost of the plant required by the constitution of California. The difference in the value of the land dry and wet more than paid the entire cost of the works. Fat dividends were paid out of it that helped send the stock to something like double its par value. Those who took it for the land in the reservoir, and those who paid in construction money not paid by sales of land, could have sold out at any time during some two years for several times what the stock cost them. Long after the boom one of the projectors refused ninety thousand dollars for his stock, which was about ninety times the value for any other purpose of the land he exchanged for it for reservoir purposes.

This company also has several thousand acres of the same kind of land left, so valuable with the water that it planted a thousand of it in lemons for itself which it is now working. Yet all this is ignored and the proposition treated by the company itself as if its sole source of reimbursement for the expense was the collection of annual rentals. To say that such a thing is a failure of irrigation works even when the company itself so alleges is nonsense.

In the San Joaquin Valley, in Arizona, and other parts of the west are companies that have in one way or another taken in large areas of land under the arid land act. Sometimes this has been done by the party making the entry deeding a portion of it to the company for the water that is to make it possible to make his proof, and sometimes by the land being entered by numerous relatives and friends of the members of the company and then transferred to a sub-company, called an Improvement Company or something of the sort, but consisting substantially of the same parties as the main company, or at any rate of the controlling interest. These lands thus acquired are often very extensive and without them the works would never have been built. Most of these companies have large areas of this still left which they could have sold for two, three and often five or six times what it cost to put the water on. But it was not enough. They thought the boom was only a natural healthy growth and wanted more. Why should they charge this against irrigation? They still have the land. They have the water to put on it, good farmers under the works on exactly similar land are making good profit on it, the company itself could do

the same, some are doing it and one in the San Joaquin is making it pay well. Yet such works are called failures because they are not paying dividends to the stockholders of the parent company, or because there is a freeze out game and a receiver to work it with, or some one of the infinite entanglements that western ingenuity can invent to dispose of the assets without paying dividends and without paying interest on the bonds. And the bonds may be all taken by one or more of the stockholders instead of paying in the money in assessments. This is right enough, but it tends to develop a discovery, a discovery that any parties not badly wanted in the corporation may be unloaded by allowing the corporation to default on its bonds and then foreclosing. No matter how much of a success the company may be so far as being paid for its water is concerned, it stands before the world as a failure. The disrepute into which irrigation projects as paying properties have fallen is largely due to the causes above given and when examined on the lines laid down it will be found that the real failures are far less numerous than they appear. They are certainly no more than there are of railroads, street railroads, and many other things in new countries. And most of the real failures have been due to mismanagement so stupid or careless that it would have made a failure of anything. But one need not know much of the west to know that a failure to pay dividends or even pay interest on bonds may be a long way from a financial failure of the proposition.



ANNEX ARID AMERICA.

STEADFASTNESS OF PURPOSE AND CONCENTRATION OF EFFORT BY THE IRRIGATION CONGRESS WILL ACCOMPLISH IT.

GEORGE H. MAXWELL.

Steadfastness of purpose is in itself a power, and this the National Irrigation Congress has attained. All that is now necessary to work out the grand destiny which may be achieved for Arid America through the reclamation by irrigation of the waste places that are now a desolate desert is that the Irrigation Congress and all its members and all those who are laboring to accomplish this great purpose shall concentrate their efforts and not diverge upon minor matters and thereby dissipate and lose the strength and influence which their limited labors would achieve. The resolutions which were published in the August number of the IRRIGATION AGE, were adopted in full by the Cheyenne Irrigation Congress, thus reaffirming the principles to which the congress anchored itself at the Phoenix session. The only additional matter added to any of these resolutions was a clause appended to the proposed resolutions endorsing the Chittenden report in favor of federal storage reservoirs, which made the endorsement of that policy broader and stronger.

These resolutions may well be republished, because they are the broad ground upon which all should unite who are working for the common cause, which is the reclamation of the arid west and the upbuilding of rural homes to conquer and occupy the deserts. The resolutions as adopted by the Cheyenne Congress are as follows:

We favor the preservation and development of our national resources by the construction of storage reservoirs by the federal government, for flood protection and to save for use in aid of navigation and irrigation, the flood waters which now run to waste and cause overflow and destruction, as recommended in the report of Col. Hiram M. Chittenden, and we urge the adoption of the recommendation of this report as to the construction of storage reservoirs in the arid regions, as a part of the national policy of internal improvements.

We favor the leasing of the public grazing lands at a nominal rental in limited areas to settlers tilling adjacent lands, the revenue from rentals to go to the states for irrigation development, leases to be subject to right of reclamation by irrigation and of settlement on lands actually cultivated, title of land to remain in federal government until actual settlement.



GEO H. MAXWELL.

RESOLUTIONS OF FORMER SESSIONS.

Resolved, That the National Irrigation Congress endorses the following resolutions, as expressing the principles heretofore enuciated at its former sessions:

1. We urge upon the American people the profound importance of the social, political and philanthropic features of the great irrigation movement, its ultimate aim being that we may become a nation of rural homes, rather than a nation of great cities.

We favor the construction by the federal government of storage reservoirs and irrigation works wherever necessary to furnish water for the reclamation and actual settlement of the arid public lands.

The value of the irrigated farm and the security of the homes thereby created are alike dependent upon sufficient public control of the water supply, and the prevention of water becoming a speculative commodity. We believe that the waters of all streams should forever remain public property, and that the right to its use should inhere, not in the individual or the ditch, but in the land reclaimed.

We favor the cession of the public lands of the nation to the respective states and territories only upon conditions so strict that they will insure the settlement of such lands by actual settlers in small tracts, and absolutely prevent their monopoly in large bodies under private ownership.

The rock upon which the Irrigation Congress split for so many sessions in its earlier history was that of State Cession, some favoring unconditional cession of all the arid lands to the states while others bitterly opposed this policy, believing that it would defeat its ostensible purpose, and result not in the actual reclamation and settlement of the lands, but in their being made the basis of speculation and eventually falling into the hands of single owners in large tracts for grazing or other purposes to the exclusion of actual settlers.

The resolution of the Phoenix Congress, favoring state session only upon conditions so strict as to insure the settlement of the lands by actual settlers in small tracts is one to which no one who desires the prosperity of the West can object. Even those who have most strongly urged state cession have argued for it on the ground that the federal government never would reclaim its own arid lands. This is a false premise. The federal government *will* do it and the day is coming near by when the great work will be begun. The strongest argument, therefore, in favor of absolute cession fails. No one, however, objects to the doing by the states of all that each state can do to accomplish the reclamation by irrigation of the arid lands within its borders, provided it is done in such a way as to insure the reclamation and settlement of the land. There should, therefore, be a complete uniting of all forces upon this policy, and each proposed enactment whether of state or national legislation should be subjected to this test and if all possibilities of the evils which would inevitably follow unconditional state cession are removed, in framing laws, the objections of those who have opposed that policy will likewise be removed.

There can be no question that in some of the grazing states of the

west enormous benefits would accrue to the states and to the people of those states and eventually to the whole people of the country if the grazing lands could be leased and the revenue derived therefrom devoted directly by the states to the construction of irrigation works.

The true theory for the development of the irrigation resources of the West must be, *first*: Federal storage reservoirs to conserve the flood waters that are now wasted; *second*: Federal irrigation works to reclaim the arid public lands, each system to be made appurtenant to and sold with the lands irrigated thereby, so that when all the lands under it have been sold the irrigation works will belong to the land; *third*: Wherever main distributing canals are necessary which are too costly for construction by the co-operative efforts of land-owners, these should be built by the states, not by issuing bonds or creating debts, but out of revenues derived from other sources; *fourth*: Co-operative distributing systems which should be constructed by the land-owners themselves under the organization of land-owners companies in which the stock should be made appurtenant to the land.

In many of the Western States the leasing of the grazing lands affords the most available source of revenue for the construction by the state of such irrigation works as must be built by it to develop its resources. There is no necessity whatever that the title to the lands should be ceded absolutely to the states to accomplish this purpose or that any risk should be run that lands so ceded will embrace lands that are not grazing lands or which may hereafter become available for agricultural purposes though they may not now be so, or that the land should fall into the hands of owners who would unite them in large ranges to the exclusion of the actual settler and home builder. These risks ought not to be run, but they cannot be avoided under an absolute cession of the lands.

The resolutions adopted at the Cheyenne Irrigation Congress favoring the leasing of the grazing lands states a policy which will accomplish all the benefits which those who advocate this leasing policy hope to achieve by it, and will at the same time obviate the evils and dangers of unconditional cession, because it provides that leases shall "be subject to right of reclamation by irrigation and of settlement on lands actually cultivated, title to remain in federal government until actual settlement."

Now, if all will unite on the broad policy outlined in these resolutions a great movement can be inaugurated which will accomplish marvels within an incredibly short space of time. There should be no opposition from any source to uniting upon the conservative ground outlined by these resolutions. Let this broad policy be the corner stone upon which to build, and then let all work together with all the aid that can be obtained from either the state or national governments

or from any of the departments at Washington in favor of this policy.

Let us have liberal appropriations for hydrographic surveys. There is no field of activity in which the national government can do more good than in the work that is being carried on by the Geological Survey in pointing the way to the development and conservation of the water resources of the country.

Let us have a Division of Irrigation in the Department of Agriculture. The preamble to the resolution adopted at the Cheyenne Irrigation Congress recommending the creation of such a Division points out the many ways in which its labors might be of vast benefit to those who are tilling the arid lands of the West, and who are confronted by many problems which they need the aid of such a division to aid them to solve.

Let us have Federal Storage Reservoirs as part of the National Policy of Internal Improvements, giving to the arid west its proportion of the whole amount expended by the national government annually for such improvements, to be used in the construction of storage reservoirs to develop the material resources of the West, as the building of river and harbor improvements develops the material resources of the East.

There is and can be no right reason why there should be conflict between either of the Departments named in working out this great problem. Let each, and the friends of each, do all that they can towards the accomplishment of the one grand result to which all are working, and let all the people once realize the enormous benefits to the whole nation that will result from the carrying out of this work, and the opportunities of each department to labor in it will be enormously increased.

Let us then give "a long pull, a strong pull, and a pull all together," and those of this generation will see *Arid America Annexed*.

IRRIGATION IN A SMALL WAY.

By H. G. PRESCOTT, Albert Lea.

There are two points to be considered in irrigation; first, to get the water; second, how to apply it. I get my supply from a tubular well, two inches in diameter, 142 feet deep, twelve feet in the rock, the water rising to within twenty-seven feet of the surface, and pump it into a tank on a tower twelve feet high. A pipe $1\frac{1}{4}$ inches in diameter runs from the tank along the side of my garden. This pipe is connected by couplings, every other one being a T for a $\frac{3}{4}$ -inch pipe. I use a pine plug to stop up the hole until we want to use the $\frac{3}{4}$ inch pipe. The $\frac{3}{4}$ -inch pipe is used for side lines of pipe and running the same way as the rows of plants. I also have twenty feet of rubber hose, $\frac{3}{4}$ -inch, and a nozzle. Now, if your cultivator is arranged right the outside hoe will make a small furrow just right to run the water in. Run the $\frac{3}{4}$ -inch pipe line along the row to the highest place and attach your hose, first taking off the nozzle. Lay the hose lengthways of the furrows, and you are ready to turn on the water. When the water has run the full length of the furrow, put the hose in another furrow, and so on. If you want to spray or run a stream of water on your plants, put off the nozzle. To spray, put your forefinger on the under side of the nozzle close to the water, and you will soon learn how to make a very nice spray. Your hose will water all the rows of plants twenty feet each side of the pipe. When that is done move the pipe to the next coupling in the main line.

I use horse power to do my pumping. Blindfold the horse, and he will go right along without a driver.

I sometimes spray the raspberry and blackberry bushes when they are ripening, holding the stream at the root of the plant for an instant—it acts like a shower. Evening is the best time. It is cheaper to let the water flow, as one has to hold the hose all the time while spraying.

For cucumbers and other vines, make a good furrow near the hills; the vines will run over this furrow, but you can use it just the same.

IRRIGATION AND LABOR.

In connection with the question of government irrigation of arid lands, which is now beginning to attract so much attention throughout the west, a report, made about ten years ago by a committee on arid lands of the California State Board of Trade, is of special interest just now. In this report, the committee draws attention to the fact that most of that part of the United States west of the one-hundredth meridian either requires or would be benefitted by irrigation. Without it crops are not certain. Thus, irrigation not only becomes a question of national interest, but a question of national necessity. The vast territory in the United States requiring irrigation covers over one-third of the inhabitable part of our country, and if the national government can wisely expend millions of dollars in keeping the water off from a portion of the inhabited part of the country, can it not with equal wisdom, expend wisely money to put water upon that portion of land that most needs it?

As showing the large area of the United States where irrigation would be advantageous, and where it is most necessary, the following figures are given:

	Acres.	Square miles.
California.....	100,992,640	157,801
Oregon.....	60,975,360	95,274
Utah.....	54,380,800	84,970
Washington.....	44,769,160	69,994
New Mexico.....	77,568,640	121,201
Nevada.....	71,737,600	112,090
Arizona.....	72,906,240	150,932
Colorado.....	66,880,000	104,500
Wyoming.....	62,645,120	97,883
Idaho.....	55,228,160	86,290
Montana.....	92,016,640	143,776

To this may be added the northern and western part of Texas, with area of about one hundred thousand square miles.

The population of our country is increasing at a remarkable ratio. as the population increases the opportunities for young and ambitious men who live in the older states of the union to gain an honest livelihood, is every year becoming less. Labor is necessarily becoming cheaper. If no more unoccupied lands are made fit for use, landholding will soon be the privilege of the rich, and tenantry the only hope of the poor.

Another point that should be regarded in this connection is the increased stability lent to a government where many of the citizens are landowners. The irrigation of these arid lands would do much to

promote the welfare of the entire nation, by taking from the unemployed classes and adding to the class of landowners.

The following paragraph from the report of the committee, might have been written today:

"Before this republic should seek to acquire new territory, it should wisely utilize the territory it now has, and it is most respectfully submitted that a national system of irrigation, directed by wise and uniform laws, controlling the rights of water and its uses will be of infinite advantage to the whole American people, and especially so if carried out under the wise supervision of the national government and engineered by its scientific and experienced men. When this is accomplished there will be ample room in the unsettled portion of the United States to find homes for the millions of people who are to come after us."

There is another feature to be considered in connection with this question. This is the large opening for labor which the construction of great irrigation works would make. The problem of the unemployed in this country is constantly becoming a more serious one. It is, just now temporarily obscured by the war, but will certainly come to the front again as soon as the war is over. The constructions of these irrigation works would be more than a temporary remedy for the evil. It would, first, furnish employment to a large number of men, and then create conditions which would enable them to get homes on the land, and become permanently self-sustaining.—*Los Angeles Times*.

MARCHING STILL.

She is old and bent and wrinkled,
In her rocker in the sun,
And the thick gray woolen stocking
That she knits is never done.
She will ask the news of battle
If you pass her when you will,
For to her the troops are marching,
Marching still.

Seven tall sons about her growing
Cheered the widowed mother's soul;
One by one they kissed and left her
When the drums began to roll.
They are buried in the trenches
They are bleaching on the hill;
But to her the boys are marching,
Marching still.

She was knitting in the corner
When the fatal news was read,
How the last and youngest perished
And the letter, ending, said:
"I am writing on my knapsack
By the road, with borrowed quill,
For the army is yet marching,
Marching still."

Reason sank and died within her
Like a flame for want of air;
So she knits the woolen stockings
For the soldier lads to wear,
Waiting till the war is ended
For her sons to cross the hill;
For she thinks they all are marching,
Marching still!

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs. Also sketches or plans of convenient and commodious barns, hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us improve the appearance of THE AGE?

LAND AND PRODUCTS—AN EXHAUSTIVE ANALYSES.

Our American newspapers often comment and sometimes severely on the fact that the English aristocracy have bought and continue to own over 20,000,000 acres of American lands located chiefly in the south and southwestern states of the Union. To this may be added at least 15,000,000 acres more, owned by the people of England and Scotland, which with the first amount mentioned aggregates 35,000,000 acres. They also own large bodies of land in Canada, in Ontario, Manitoba and the Northwest Territory; in Mexico and in the Central and South American republics, which added to their holdings here will foot up a total of 75,000,000 or 80,000,000 or possibly 100,000,000 acres. But as a business or financial proposition this circumstance furnishes no just ground for complaint. The investing British public like the investing American public naturally look out for the safest, the best and most lucrative avenues for the investment of their surplus earnings and there invest them; that is right, it is rational, practical common sense and the exercise of good common sense is always commendable, whether by Europeans or Americans. What the great mass of men and women all over the world want and strive to have is a dividend paying investment, a revenue; and it has been demonstrated over and over again that nothing equals *well selected* productive land under good management, because in addition to

the revenue it yields annually it increases in value and sometimes very rapidly.

The acquisition of land by Europeans on the American continent commenced many long years ago and has all along been growing and developing until now their landed possessions in the new world are enormous and yet they are not done; year by year they are extending their areas by new acquisitions and they do so because that class of investment pays them better than any other.

In many cases where large bodies of land have been secured in particularly favorable localities and where its proper, successful utilization demanded more capital than any one private individual can devote to that purpose, chartered companies have been formed and stock issued and divided up with the public, largely with small investors, who have steadily drawn and are now drawing handsome dividends from their shares.

As my attention has frequently been called to this subject I have given it considerable study and noted many facts and figures connected with it, so much so that I fully realize the wisdom of this method of the money grabbing Englishmen and the cannie Scotchman. Let us demonstrate the proposition. A recent well-informed writer on the cattle industry makes a calculation that is interesting to follow. He starts out with the assumption that 25,000 head of common range cattle are placed on a new ranch in 1898, consisting of 24,000 cows and 1,000 bulls, and esti-

mates the ratio of increase at 90 per cent, and that is a well established rule in the southwest.

In 1899 he makes the increase on the 24,000 cows at 90 per cent, 21,600 which when added to the original 25,000 will make the herd number 46,600. He then follows another generally accepted rule that the sex of the increase will be about equal, that is one half will be heifers and the other half will be steers. Accordingly as the product of 1899 is fixed at 21,600, there will be 10,800 heifers and 10,800 steers.

In 1900 the increase will be the same as in 1899, namely 21,600, this number added to 46,600 the total of that year will make 68,200 and according to the rule, there will be 10,800 heifers and 10,800 steers.

In 1901 there will be the original stock of 24,000 cows to which must be added the 10,800 two year old heifers of 1899 which will aggregate 34,800 cows. At 90 per cent the increase on 34,800 cows will be 31,320; add this number to the last year's total that was 68,200 and it counts 99,520; dividing the 31,320 increase according to sex there will be 15,660 heifers and 15,660 steers.

In 1902 we add to the 34,800 cows counted in 1901 the 10,800 heifers of 1900 and count 45,600 cows at 90 per cent the increase on 45,600 cows will be 41,040. Add this number to the 99,520 held in 1901 and the total will be 140,560; dividing the year's increase, viz., 41,040 according to sex there will be 20,520 heifers and 20,520 steers.

In 1903 we add to the 45,600 cows counted in 1902 the 15,660 heifers of 1901 and we have an aggregate of 61,260 cows. At 90 per cent the increase on this herd of cows will be 55,134, add this number to the last year's total, that is 140,560 and the herd will count 195,694; dividing the increase of the year according to the sex there will be 27,567 heifers and 27,567 steers.

In 1904 we add to the 61,260 cows of last year the 20,520 two year old heifers

of 1902 and count 81,780 cows. At 90 per cent the increase on the herd will be 73,602; add this number to 195,694 that was last year's total and the result will be 269,296. Now dividing the 73,602 the year's increase, into equal parts there will be 36,801 heifers and 36,801 steers.

In 1905 we add to the 81,780 cows of 1904 the 27,567 heifers of 1903 and count 109,347 cows. At 90 per cent the increase this year will be 98,412; add this increase to 269,296 which was last year's total and we count 367,708; to this must be added 73,602 that was the increase of 1904 with a grand total of 441,310 cattle in place of the 25,000, the original stock of 1898.

These figures, to the inexperienced, may seem large, but it must be borne in mind that they have been doubling up at the rate of 90 per cent, compound interest for seven years, which is sufficient to make the calculation appear just and reasonable.

Now taking an all round average of \$10 a head for the original 25,000 cattle that we commenced with it will amount to \$250,000; averaging our present increased stock that is 441,310 cattle at \$10 a head the total will foot up \$4,413,100, a net cash value in excess of the original herd of \$4,163,100.

Another point to be noted in this calculation is; year after year we have been selling off from 10,000 to 30,000 steers for cash as they were put into the market. Had we reinvested the money received from these sales in productive cows, the grand total would far exceed the present figures. It must also be noted that I have fixed the all around price at the low sum of \$10 a head because they are common range cattle that run out and make their own living the year round; graded cattle pastured in the timothy and clover fields of the middle western states and fed during winter would be worth at least three times these figures but to be just we must remember that the cattle of the middle western states do not increase as fast as they do on the gramma grass of the warm southwest.

My calculations as to increase may vary a little either way but experience teaches that out in the southwest to which I have referred, it is reasonable and as nearly right as such an estimate can be made while a variety of causes may combine to vary it somewhat either way.

Thus far we have been following the figures of a careful western writer. But to be on the safe side, to make allowance for all contingencies we will discount and lop off 25 per cent and instead of using his figures viz., 441,310 we count 331,000 and their value is \$3,310,000.

At the first blush even these figures after the 25 per cent discount look large and require to be well digested in order to comprehend their significance and realize the truth they convey. But it is nothing more or less than compound mathematical progression and that is just what the money grabbing Englishmen and cannie Scotchman understand to perfection and explains why those British financiers have bought and stocked with cattle large bodies of land in the United States and other countries in the new world.

I am advised that there is a cattle queen in Southern Texas who has accumulated a princely fortune from a small herd of cows turned out on the plains about fifteen years ago and a cattle king in Mexico who placed a herd of a few thousand cattle on a range in that sunny land some years ago and now counts his wealth by the million but cannot count his cattle for their great number. Let us now look on the subject from another standpoint.

The books tell us that the first cattle imported into this country were of low grade and light in weight. Subsequently the importations were more for the purpose of improving the grade than for increasing their number. We read that the average weight of the cattle imported into this country in 1624 was less than 300 pounds a head and in 1740, more than a century later, the average weight of beef cattle on the London market was 370

pounds. As late as 1803 the average weight was only 496 pounds. In 1833 it had reached 736 pounds. Since that time it has steadily increased until now, in the English and American markets the weight is enormous, reaching 6,000 pounds and more, while 1,000 pound cattle are as common as prairie marigolds in summer.

This increase in weight has been brought about by judicious grading, careful selection and feeding. This grading, selection and feeding is in answer to demand for more butter, cheese, and more and better quality of beef. It is estimated that there are now more than \$500,000,000 invested in cows alone in the United States. The official report of the Department of Agriculture at Washington gives 16,504,629 as the greatest number of milch cows on the farms in the United States at any one time since 1880 and fixes their value at \$423,486,649. As this does not include the cows owned and kept in the cities, nor thousands more on the mountain ranges, the prairies and plains of the far west that are never reported to the Department, \$500,000,000 is really less than the cash value of the milch cows in the United States today. The number of other cattle is given in the Department report at 37,651,239 and valued at \$694,382,913. These figures are probably a fourth below the actual number and real value. But added together as given in the official report of the Agricultural Department at Washington the cows and other cattle number 54,155,868, and their cash value \$1,117,869,562. To the casual observer these figures are staggering, but they are correct nevertheless, because they are official as given by the Department at Washington and the United States government is responsible for their accuracy, or at least that they are within the lines, and it may be accepted as mathematically true that the figures are 25 per cent below the real number and cash value. On that basis the correct number is 71,233,802 worth \$1,397,336,952. Our cattle exports in-

THE IRRIGATION AGE.

creased from 182,756 in the year 1880 to 331,722, in 1896 in numbers and from \$13,344,195 in 1880 to \$30,603,796 in 1896 in value, being an increase of 129.3 per cent. The average value of cattle exported has thereby increased from \$73 in 1880 to \$92 in 1896. The Department report goes on to say, "This apparently high value is the result of various causes. In the first place, only the best and heaviest cattle are exported, usually weighing from 1,300 to 1,700 pounds each and they command a much higher price than the average." But this 30,000,000 and odd dollars of live cattle export is a small item in comparison to the dressed meat and canned meat, butter and cheese that go across the water every year. The increased value of the exported cattle proves however, that the better grade and the better fed the higher the price and greater the profit. And this leads me to the consideration of another phase of the subject. The exportation of dressed meat will henceforth be enormously augmented and the demand proportionately increased as Armour & Co. have inaugurated a "daily service" of dressed beef shipments from New York to London to furnish American beef to the English markets direct from the refrigerator cars without the intervention of wholesale houses or special agents. Refrigerator space has already been engaged in the White Star, the Cunard, and other trans-Atlantic steamships to furnish the daily service and refrigerator cars have also been secured in England and in the United States so that from now there will be a continual stream of American dressed beef amounting to hundreds of tons daily rushing across the country to the sea board and from there by fast steamers over the ocean to England and thence to every market in the British Isles, and as I have before remarked the service will create a new and large demand for American dressed beef.

In this examination it may be proper to note our progress in the manufacture and exportation of butter and cheese. In ad-

dition to our large exportation of ordinary gilt edge cheese that is annually increasing and now amounts to about \$4,500,000 a year, we have advanced to the point of excellence where we are manufacturing a high grade foreign cheese for exportation to the amount of about \$15,000,000 a year, including Roquefort, Camembert, Garganzola, Stittan, Cheshire, Swiss, and limburger.

Our exportation of butter is also increasing from year to year, and now amounts to about \$4,750,000 annually. And as strange as it may appear to the casual reader there are tons and tons of poultry, turkeys, geese, ducks, and chickens, sent across the Atlantic to feed the hungry in the good old mother country, the British-American ranchers so manage their affairs as to make everything contribute to the general revenue on the commendable principle, "Take care of your nickels and your dollars will take care of themselves."

Recurring to the advantage of graded stock all will admit that for beef, a 1,000 pound animal is worth much more in proportion to its size than a 500 pound animal, because the bone and offal of a steer above 500 pounds do not increase in the same ratio with the meat, or anything approximating it and beyond that the meat of the larger, better graded and well fed animal is better and worth more than that of the common range steer that has had to rustle for a living. Our American stockmen began to realize these facts many years ago, and year by year they have devoted more attention to the grade and grading of cattle, until now we rank all other cattle countries. A few years ago the British government sent a special cattle commissioner to all foreign countries to examine and report his findings. As the result of his investigations he reported that the American cattle as a whole ranked well and that a particular herd in Ohio excelled all others in the world. Since that time herds in other states have been so improved as to rank

with the best on the globe. A recent writer says, "The southwest has taken the lead of other states the past year in the introduction of pure breeds of beef cattle. The herders in these states have not allowed the price of high-class animals to cut any figure in the matter, for as a rule the higher the price paid the better the animal and the result. These same western men are today beginning to sell to the western farmer their high grade yearlings to mature and fatten for the market. Short horns and Herefords, stockmen say, will make more herders rich during the next ten years than ever did the longhorns in thirty years."

After this general review let us resort to a few figures on a business basis. We will commence with a capital of \$3,000,000, buy your land, cattle, horses, farming implements and everything necessary to carry on successful ranch operations. We will stock our ranch at the outset with 12,000 head of graded cattle at the rate of \$15 a head.

On the basis of 90 per cent increase as figured out above year by year the herd in seven years will number 221,655 graded cattle. If we accept the suggestion of our western author, sell our two year old steers and replace them with two year old heifers the herd in seven years will number a great many more. But holding to the 221,655 and even then to provide against all possible contingences and bring the number surely within the line of actual results we discount these figures at the rate of 15 per cent and count 188,407 cattle worth \$15 a head, just what we paid for the original stock and their cash value will be \$2,826,105, or 10 per cent compound interest on our capital.

Should we determine to stock our ranch with a higher grade of cows they will cost say \$30 a head and allowing the increase to be the same the profit will be much greater as the 221,655 cattle discounted at the rate of 15 per cent will give us in this instance, as before 188,407 cattle but the higher grade and greater value per head

makes the herd now worth \$5,652,210 or nearly double our original capital in seven years, thus proving our position in the earlier part of this article, that is, the higher the grade the greater the profit.

Where money is loaned on bond and mortgage at four or five or even six per cent the lender gets his interest and at maturity of the mortgage the principal is returned. In this case the holders of stock in the company gets ten per cent with the medium grade cattle and twenty per cent higher interest with the better grade, while the land in which the capital is largely invested has doubled and trebled in cash value.

In my next letter I will write on the productions of the soil, etc.

WALLACE HARRINGTON,
San Antonio, Texas.

A COW BARN WITH FRAMEWORK OF STEEL.

Steel for railroad and highway bridges is now the rule rather than the exception. Nearly all of our new modern manufacturing plants are also constructed of steel rather than of wood. Steel for the framework of ordinary buildings however, has not come into so general use and no doubt the illustrations which we give with this article will be of interest, from the fact that, as we believe, it is the first time in history that a cow barn has been constructed using a steel frame.

Figure No. 1 is taken direct from a photograph, and shows the exterior of a cow barn designed and built by us for the State of Connecticut on the grounds of the Hospital for the Insane, at Middletown, Conn.

Figure No. 2 shows the plan of the building, the general dimensions of which are 200 feet in length and 47 feet 8 inches in width. For a distance of 101 feet at the north end, the building is two stories in height, the lower or basement floor being used as a root or vegetable cellar. Over this portion of the barn the floor is made of steel beams supporting brick

arches; the floor of the cow stable itself being throughout of concrete and cement, thus eliminating all danger from the contents of the cellar being contaminated from the refuse from the floor above.

Figure No. 3 shows a cross-section of the barn through the two-story portion, giving the general dimensions and heights. The heavy 24 inch masonry pillars shown in the cross-section of the vegetable cellar are not continuous walls, but are only isolated pillars or columns 24 inches

of 101 feet, but for the balance of the barn the cross-section is the same as shown in figure 4 without cellar.

Figure No. 5 is taken direct from a photograph and gives a view of the cow barn looking down through the center aisle, this view being taken from a photograph when the barn was completed and before it was occupied.

Figure No. 6 is an interior view taken from a point near the side of the stable, and shows the stalls, each 8 feet in width,



FIG. 1.

square, placed 8 feet apart, for supporting steel columns in the interior of the building, which columns in turn support or brace the wooden partitions between the stalls and also support the steel roof trusses of the building.

Figure No. 4 shows the cross-section of the barn through the main portion, the dimensions being exactly the same as in figure 3, except that there is no cellar under this portion. The root cellar is under one end of the barn for a distance

with a cement trough or feed box, and the cement gutter behind the stalls to receive the droppings.

The supporting columns, as will be noticed from Figures 3, 4, 5, and 6, are placed 8 feet apart, that being the width of each stall—provision being made for two cows. The cows are confined by tying instead of in the usual manner with stanchels. The feed troughs are V-shaped, formed of wooden planks, which, as shown in both cross-sections Figure 3 and

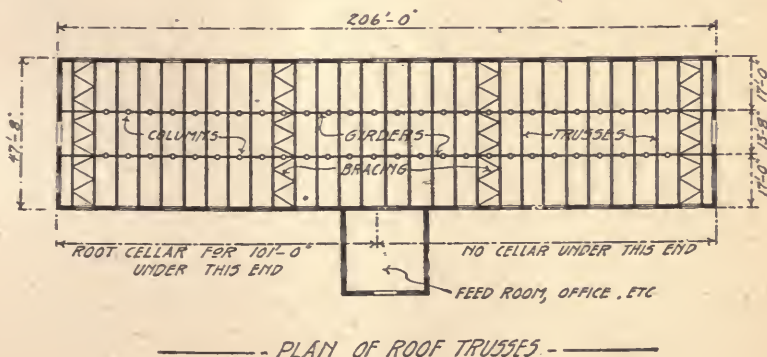


FIG. 2.

of brick throughout, the roof being constructed of 2 inch plank covered with tar and gravel. This construction was adopted for particular reasons in this location, but we would recommend that an improved construction would be to use an ordinary gable roof in place of

The ventilation of the stable is secured by a monitor extending through the length of the building, provided with windows on each side, these windows being arranged to swing open and shut by cords operated from the floor, as shown by cross-section Figures 2 and 3. In this way we believe



FIG. 5.

the flat roof, the roof covering being of corrugated iron, thus insuring an absolutely fire-proof construction, better air and ventilation in the interior of the building, and providing a space over-head, between the roof trusses, for storing lumber, boxes, supplies, etc.

perfect ventilation is secured during all kinds of weather.

The passageway in the center of the stable is 6 feet in width. The floor being of cement, a push cart can be easily moved back and forth to distribute the feed. Ample provision is made in rear of



FIG. 6.

stalls next to the side walls, so that the refuse can be taken out by push carts provided for that purpose. or if desired, there is sufficient width for a horse and cart to pass in and out.

The cost of the stable complete was about \$12,000, but as a portion of the material was furnished by the Asylum authorities, and a large amount of labor was furnished by the patients, the exact cost of the building cannot be ascertained. For Public Institutions, where much of the labor is furnished by the inmates, and consequently costs little or nothing, the construction particularly commends itself.

The architect in charge of the construction of the barn was J. D. Sibley, of Middletown, Conn., who also designed nearly all of the buildings at the Institution. The steel work throughout was furnished by The Berlin Iron Bridge Co., of East Berlin, Conn.

RECLAIM THE LAND.

A. Barnett, of Ramona, San Diego Co., Cal., writes as follows concerning his land:

"I have about ten acres of land that I flow above a dam on San Vicente Creek, and as I draw the water off, I plant. This year the first piece drained was planted to Kaffer; I cut one crop and another was ready the first of October. The next piece drained was planted to sweet corn which as fed to cows and horses through the

summer. It was a heavy crop. On July 12 I planted the next piece—about three acres—to sweet corn, thick in drills three feet apart; ran the cultivator through it twice and cut it Sept. 15. It was just tasseled and had very little silk. I measured off one-sixteenth of an acre and the crop from that, when well dried, weighed 650 pounds. This was a fair way to average the crop as it was very even. The next piece was planted to potatoes and turnips which did very well when the weather became cooler.

The past season has been the worst ever known here; beets and some other crops would not grow even with plenty of water, the air was so dry and hot. The land is not of the best; it is on a sandy bottom with a good deal of coarse sand and gravel, but it is growing better every year from the sediment deposited by the water and will continue to bear good crops every time for one hundred years without manure. There is no alkali and no gophers.

I write the above in the hope of calling people's attention to this land, with the view of having it reclaimed. I know of hundreds of acres of such land, much of which produces nothing but salt grass, which might be reclaimed with much less expense than mine was. One acre I have for fish.

PULSE OF THE IRRIGATION INDUSTRY.

A PROMISING PROPOSITION.

The following is a letter received some time ago from Mr. W. S. Burke, of Albuquerque, N. M., and as the offer may be an inducement to capitalists to invest, we give it to the readers. Mr. Burke gives as reference the Albuquerque Bank of Commerce:

"Albuquerque is much the largest town in New Mexico, and is the commercial center of the territory. Immediately east of the place, and lying parallel with the Atchison Topeka & Santa Fe railway, is a plain with an area of over fifty thousand acres all of which is too high to be irrigated from the river, but can be watered by the building of storage reservoirs. The land is of the richest and most valuable tract in this county. The plain is bounded on the east by the Sandia mountains, and extends thence west almost to the city limits. Just on the western edge of the plain, and overlooking the town and the Rio Grande valley, is the University of New Mexico, twelve miles from the mountains. The best reservoir site, and the only feasible one for a number of miles, is at the mouth of Tijeras canyon, immediately east of the university. Here, by the building of a dam, water enough can be conserved, according to the estimates of engineers, to give an abundant supply for twelve thousand acres of the best part of the plain—best only because nearest to town; otherwise all the land is alike. If it should be desired to take in a greater quantity of land the water could be secured by the building of feeding reservoirs, at points up the canyon. The building of the main reservoir and the necessary ditches to carry the water on to the land would cost about

fifty thousand dollars. The land has all been a part of the public domain, and is not embarrassed with any great complications. A portion of it, probably 25 per cent, has been taken up by settlers under the public land laws, and these people are nearly all willing to give one-half of their respective holdings for the privilege of buying water for the other half at any reasonable rate a company might establish. In this way a bonus of about four thousand acres can be obtained, worth as soon as it can be irrigated, an average of not less than thirty dollars an acre.

This would pay more than twice the cost of the entire work. The superior character of the land, and its favorable location would insure its occupation by farmers and gardeners as soon as a water supply could be had, for there is an excellent market at home for everything that can be raised out of the ground, and more than half of all we can consume in the territory has to be shipped in from the states. The annual charge for water in this country is never less than two dollars per acre and the company's income could therefore be reckoned safely at \$24,000. The management of the dam and ditches with reasonable repairs would not cost more than \$4,000, for aside from one man at \$1,200 or \$1,500 a year, everything could be done with Mexican labor which is very cheap, leaving a net income of \$20,000 a year from a plant that will have been built entirely by the proceeds of property contributed.

The land in question lies in the heart of the sugar beet zone, and analyses of beets produced in the immediate vicinity show as high a per cent of both saccharine matter and purity as the best grown

n any part of the United States. All the facilities for conducting a beet sugar plant are excellent at this point, and if the irrigation proposition could be taken up by a company with a capital sufficient to put up a factory, the outcome would be much greater. A first class factory, with the necessary working capital involves about half a million dollars. Sugar beet lands, accessible to factories, at any point where this industry has been established, are worth from one hundred and fifty to two hundred and fifty dollars an acre. This land would be worth as much as the best now in use, but assuming that it would be worth no more than the cheapest land now in use for the purpose, the bonus received by the company would represent enough to cover the entire outlay for both the irrigation plant and the factory.

I am fully aware of the fact that these propositions may look to a stranger very much like the great schemes of Col. Mulberry Sellers, but if any cool headed business man will come here and let me show him the situation I think he will be convinced that all the foregoing statements are under rather than over the truth."

IN FAR-OFF INDIA.

India has the largest and most extensive irrigation system of any country and is therefore best fitted to say whether government irrigation enterprises are profitable or not. "*Indian Engineering*," published at Calcutta, contained in its September number an article on "Madras Irrigation, 1896-97," in which a comparison is made of the work done in these two years. In closing this article states:

"The three best irrigating systems, the Cauvery, Godaveri, and Kistna, yielded as dividend respectively 46, 16, and 10 per cent. These works have brought, when every charge is paid, a surplus profit of nearly seven and a quarter lakhs. Unusually high floods caused much damage throughout the province, and consequent exceptional expenditure upon repairs cut down returns from irrigation

works to figures less than those of the two previous years. But still the year's work yielded on the whole an eminently satisfactory result. Facts of this nature serve to emphasize the now admitted truth that irrigation works afford a safe—perhaps the safest—investment for people's money."

Under the heading "What Eddy, Eddy County and the Lower Pecos Valley (N. M.) Have:" the *Pecos Valley Argus* sums up many advantages. Among them:

"Three hundred and forty days of sunshine in each year.

"A nearness to the markets of the east not enjoyed by any other irrigated district.

"The most extensive, complete and convenient irrigation system in the United States, affording absolute protection against drouth and crop failure. Twelve hundred miles of irrigating canals delivers the water to the farmer's door."

And under the heading of what this section "Wants" is given:

"Hundreds of enterprising homeseekers and tillers of the soil, for it is the intention of the managers of the great irrigation enterprise to place the rich lands along their canals within the reach of every industrious farmer.

"Men who know that a forty-acre irrigated farm will pay more net profit each year than a 160-acre farm dependent on rainfall. And that ten and twenty acre tracts properly tilled are ample for the support of an ordinary family."

A correspondent to the *Boston Herald* makes a plea for a representative of our country in Mexico. He says: "I, in common with other countrymen, would like to see an American ambassador in the capital of Mexico. We send an ambassador to republican France; why not to republican Mexico? * * * Let us show the Mexican people that we desire to treat them with the highest consideration, that we desire their good will and their practical alliance; let us show them that we esteem them as our equals."

WITH OUR EXCHANGES.

LADIES HOME JOURNAL.

The November issue marks the fifteenth birthday of this now famous publication. During that short period it has developed from an eight-page magazine with a few hundred readers, to one of fifty-two pages with the present immense circulation of 850,000 copies monthly. Under the modest caption "Fifteen years of Mistakes," the editor, Mr. Bok, traces the history of the *Journal* in the past and gives a short outline of what its future is to be. It is a history he can well feel proud of and the journal today is a splendid example of what may materialize from a small beginning. Its one fault is the unhandy size, but after the clear explanation of why this size is still retained, which Mr. Bok gives, we will patiently await the change which we hope the future will bring. We are given the first of the three illustrated articles which are to appear called "My Collection of Dolls," of much more interest than would be supposed from the title. The oddest of those in this month's illustrations is the doll made by nature—the mandrake root doll. "Snap Shots at Famous People," from the private collection of Maj. Jas. B. Pond, is a page which will be appreciated by nearly all readers, serving as it does to give us a glimpse of some of our favorite writers. The second article "About Men" will of course be read by the women and will be found to contain a great deal of what is vulgarly called "good horse sense." Those interested in palmistry will find something to their liking in "Easy Reading of the Palm" by Blanche W. Fischer. These, and many more equally good things serve to make the *Journal's* "birthday number" especially attractive, not the least of them being the handsome cover.

THE REVIEW OF REVIEWS

for the month contains articles on the timely topic of the Nicaragua canal: one by Prof. L. M. Keasbey, "The Nicaragua

Canal and the Monroe Doctrine" deals with the subject from the political standpoint, while Dr. Emory R. Johnson, who has devoted much time to the study of the economics of transportation, treats of the commercial side, the trade benefits to be derived from the construction of the canal. These articles are such good ones that we urge all who can to read them and gain a idea of what the Nicaragua Canal would mean to this country.

THE FORUM

Is another magazine that devotes some space to the discussion of the proposed Nicaragua Canal and ex-Senator Warner Miller answers many of the questions so often asked regarding this immense venture; First as to its feasibility, is the route proposed possible from an engineering point of view; Second, as to its desirability, will it greatly benefit American interests; and, Third, will it pay? All of these questions he answers in the affirmative, giving his reasons for so doing. "The Change of English Sentiment Toward the United States" is discussed by Sidney Low, late editor of the *St. James Gazette*. Among the other many important subjects taken up in the current issue are "Some Weak Places in our Pension System," by Maj. S. N. Clark; "The Dreyfus Affair," by Yves Guyot; "The New Panama Canal," by Brig.-Gen. H. L. Abbot; etc., etc.

SCRIBNERS'.

Walter A. Wyckoff reaches the end of his long journey and career as a day-laborer in "The Workers—the West—from Denver to the Pacific," in the November *Scribner's*, and this second series, describing a remarkable experiment, will be shortly issued in book form. Thomas Nelson Page's first long novel, "Red Rock," also ends in the November number, and will be published immediately as a book. Jesse Lynch Williams contributes another of his newspaper stories.

It is called "The Great Secretary of State Interview," and describes with graphic realism an incident in the career of a young reporter.

MCCLURE'S.

The recent threats of a new outburst of Vesuvius give timeliness to an article by H. J. W. Dam on the "Mystery of Vesuvius," appearing in the November number of *McClure's Magazine*. Mr. Dam and the artist C. K. Linson made a recent exploration of the volcano, for *McClure's*; and the article embraces much new information thus gained. It will be illustrated from special drawings made by Mr. Linson on the spot.

From the Canadian Department of the Interior we received the report on "Irrigation and Irrigation Surveys" for the year ending June, 1897. In addition to the report proper, are numerous maps and surveys showing not only present irrigation systems, but proposed reservoir sites, etc. The plates used in the report are especially fine.

A neat little pamphlet has been received from the United States Department of Agriculture, dealing with the very important subject of good roads for the country. "Must the Farmer Pay for Good Roads?" is the title: it is written by Otto Dörner, Milwaukee, Wis., chairman National Committee for Highway Improvement League of American Wheelmen, and was published by the League, but adopted by the Department of Agriculture as circular No. 31. When we consider that in many farming districts the roads are so poor as to be practically impassible for vehicles during certain parts of the year, we will realize at once the necessity of agitating the matter of state aid in building roads.

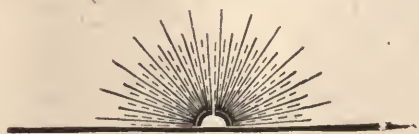
Into this little pamphlet or booklet of forty-four pages, the size of page being only $3\frac{1}{2} \times 6$ inches, is crowded a great deal of instructive reading, together with over thirty illustrations. The different heads under which the subject is treated are "Aims of the League of American Wheelmen—State Aid—Cities Should Help; What New Jersey Farmers Think of State Aid; The Cost of Hauling Crops; Roads and Road Machinery; Building Macadam Roads; Railway

Tracks on Highways; Importance of Wide Tires; and Good Words from Good Men," being the opinions of such well-known men as Sec'y Wilson, ex-President Harrison, J. M. Rusk and others on the improvements of roads and highways. This book is a practical treatise on a most important subject and should be in the hands of every progressive farmer. The contrast of the road before and after being improved is shown by means of good illustrations. The L. A. W. deserves much credit for its work in this direction.

One of the things that come to our desk this month which is deserving of mention is the catalogue of the Lidgerwood Manufacturing Co., manufacturers of hoisting engines. It is certainly a work of art and in arrangement, typography, paper and press work is something of which the publisher, as well as the Lidgerwood Company may well feel proud.

The *Spokesman-Review*, of Spokane, Wash., came out the last week of September with a supplement consisting of twenty extra pages, and an illustrated cover printed in colors. This was devoted to facts, figures and views of Spokane and is a credit to the Review as well as a welcome visitor to the subscribers.

The first issue of the *Vinemont News* (Vinemont, Ala.) has been received. This neat little sheet made its initial bow to the public Sept. 30 and it evidently intends booming Vinemont for all there is in it. The Southern section of the country has been comparatively unknown and unappreciated as a location for prospective settlers, but owing to the efforts of several men, among them Joseph Barron, of Chicago, the tide of colonization has turned to Cullman County.



ODDS AND ENDS.

THE RIO GRANDE DAM.

In commenting upon the article by Nathan G. Boyd, M. D., entitled "Rio Grande Irrigation," which appeared in the October issue of the AGE, the *Silver City Enterprise* (Silver City, N. M.) says; "We have not the honor nor pleasure of being acquainted with Nathan G. Boyd, M. D., the author of the article published in the IRRIGATION AGE and referred to above, but we do know for a certainty, of our own intimate knowledge of the facts in the premises, that Mr. Boyd is thoroughly well and truly informed in regard to the matter of which he writes and which he justly stigmatizes as 'an official crime.'"

Discussing the navigability of the Rio Grande the editor remarks further on: "A navigable river, but they did not allege the kind of craft with which it might be navigated. Three weeks ago today we travelled from Rincon to Albuquerque, on the A. T. & S. F. R. R., which follows the river in its course the greater part of the way, and for miles at a stretch not a drop of running water was to be seen, only an occasional stagnant pool, perhaps one to two feet in depth. Yes, and occasional stretches of miles without even the stagnant pools, only the dry white burning sands of the river bed, navigable for the patient Mexican burro, but still better suited to navigation by the camel accustomed to the burning sands of the Sahara. This was the navigable river which United States officials procured an injunction to restrain a company from placing obstruction to navigation in its course. Nor is its condition this season an exception. We have seen it thus every season for the past sixteen years.

"A dastardly outrage has been perpetrated upon a company composed largely

of capitalists of a friendly foreign nation. The courts of the United States have been disgracefully brought into ridicule and disrepute by the prosecution of this absurd suit based upon the navigability of the Rio Grande river."

SPIRAL RIVETED PIPE FOR WATER WORKS CONSTRUCTION.

The great strength and long life of Root's Spiral Riveted Water Pipe, the ease with which it may be handled, and the fact that it is not liable to give trouble through leakages, make it especially desirable for water works construction.

The Abendroth & Root Mfg. Co., 28 Cliff street, New York, sole manufacturers, report a number of large orders recently received for their pipe for this particular service.

To Sheely & O'Shee Co., contractors, of Lincoln, Neb., they have lately shipped 12,000 ft. of spiral riveted pipe which will be used in extending the water works at Lanesboro, Minn. About 10,000 ft. have been sent to Milledge, Ill., and 15,000 ft. to the city of Augusta, Wis. The U. S. Water Steam Supply Co., contractors, Kansas City, have placed an order with the Abendroth & Root Mfg. Co., for about 5,000 ft. of pipe which will be used at Concordia, Mo., and 6,500 ft. are to go to J. L. White, contractor, Wyoming, Ill.

Modern Mexico for November contains an entertaining account of a visit to a Mexican theatre. The author, Irene A. Wright, attended the theatre "Principal" of Mexico City one afternoon and thus sums up her impression of it: "But badly set, badly costumed, and badly paid, as is the Mexican theatre, it can often set the American an example in morality, and at least compare favorably with it as far as the true genius of acting is concerned. The music is always good; the dances typ-

ical; the innocence of the little plays and the absence of abbreviated costumes is positively refreshing."

In its interior arrangement the theatre is quite different in appearance from our own, the boxes being on three sides, divided into four floors reaching to the roof and resembling our galleries. They are plain, dirty, uncomfortable affairs. Down below the choice seats are those directly in front and that they are very near to the deafening orchestra is no drawback. At 4 o'clock in the afternoon the matinee begins and does not end until 8 in the evening. It consists of three or four short plays and admission is paid either by the piece, or, by the afternoon. There is a prompter who has a stand before the stage and he reads the lines in an undertone a few words ahead of the actors. As his gestures can be quite plainly seen by those seated on the sides of the theatre and as his voice even is often quite distinctly heard by them, it does not enhance the interest of the play.

"The result of the war has, without question, improved the general standing of Americans in Mexico, and through the same cause many Spaniards find that they do not receive quite the same homage from the native populace that they did before their recent ignominious defeat. These changes are not marked to the casual observer, but they exist and will work to the advantage of American enterprise and trade in the Republic."—*Modern Mexico*.

The arrest of Jesse James, the son of the noted out-law, brings the "James Brothers" once more to mind, Frank still survives, being 55 years of age, and recently paid his nephew a visit at Kansas City. In a talk with a reporter he made a few remarks which, outlaw though he has been, are worthy of repetition. He said that some one, hearing him endorse the policy of the present administration, asked him if he had turned Republican. Said he: "I replied that I had not. But I told him I'll believe old General Joe Wheeler above any man on earth, and I believe my boy who is now in the regular army and got as far as Tampa.

There's the authority of the highest and the lowest, and it's good enough for me. McKinley is my President, the flag is my flag and I was an outlaw to the Union for four years and to the world for fifteen, but this is my country and I love it and hundreds and thousands of detectives and a price of \$20,000 on my head couldn't drive me out of it and it didn't. This is my administration and I'll stand by what it did even if I didn't vote for it. That's why I let my only boy go into the army."

A Spanish newspaper description of Theodore Roosevelt is an example of unconscious and unintended humor, and will cause American readers many a hearty laugh. The item in question is quoted from a Madrid newspaper by the *Saturday Evening Post* and reads as follows:

"The commander in chief of the entire American army is one Ted Roosevelt, formerly a New York policeman, who was educated at Harvard Academy, a commercial school (there being no universities or colleges in America). His body-guard is termed 'rough rioters.'"

The *Literary Digest* of recent date, calls attention to an article written by Mr. W. H. Sargent in which he points out the resemblance certain mechanical appliances bear to natural objects. It is interesting to note, for example, how closely the hay-tedder resembles the grasshopper's legs: the pillar of an upright drill that of a tree trunk in size and shape; the pulsometer, the human heart; while the illustration of a hay carrier is so much like that of a crab that one wonders at never having noticed it before.

Mr. W. H. Hamlin, farm superintendent of the Santee Normal Training School, Santee Agency, Neb., writes that they are trying to raise \$3000 with which to put down a good artesian well for irrigating purposes. Of this amount \$900 has already been contributed. The AGE wishes them success in their efforts.

In the August issue of the AGE mention was made of a shooting affair that occurred between two farmers of Idaho Falls, Idaho, as a result of a dispute over water rights. Mr. Johnson, the one who did the shooting, was convicted at the trial which was held not long ago, and a damage suit will probably follow.



IN GOLD VIEW VALLEY, BUNCOMBE COUNTY, NORTH CAROLINA.

THE IRRIGATION AGE.

VOL. XIII.

CHICAGO, DECEMBER, 1898.

NO. 3.

THE PROGRESS OF WESTERN AMERICA.

Our Plans for 1899. This number of the AGE being the last one for the year 1898, it is fitting that in it we should give a brief outline of our plans for the coming year.

In 1897 a party was sent out through Wyoming to investigate the question of the construction of reservoirs in arid regions through the agency of the general government. Among the members of this party were Prof. Elwood Mead, Capt. Chittenden, Col. Nettleton and Mr. Johnson. We will have the good fortune to present to our readers during the coming year, the results of their investigations in a series of papers written by the above named gentlemen and published under the general heading of "The Irrigation Problems and Possibilities of Northern Wyoming: A Symposium." This will be illustrated by views of different points visited, which will add to the interest of the article. The first article in the series, that of Elwood Mead, State Engineer of Wyoming, entitled "Some of the Agricultural Problems and Possibilities of Northern Wyoming," will be given in the January issue.

Joel Shomaker contemplates writing for us a series of articles on Co-operative Irrigation Colonies, Corporation Irrigation Communities, and Individual Irrigation Enterprises, in response to a demand for more knowledge regarding these subjects. The first of these articles will appear in the January number.

Another who will contribute during the year is Lodian Lodian, of Paris, France, a civil engineer whose profession has taken him to many portions of the globe, and

whose first contribution will be regarding the "Waste Lands in Europe."

While we cannot positively assure our readers of the continuance of T. S. Van Dyke's articles, we hope he will favor us in the future as in the past with witty and instructive writings.

Papers read at the Kansas State Horticultural Society meeting, and from different writers throughout the west and southwest will appear during the coming year, together with the usual number of agricultural, editorial and general news articles. We intend giving more illustrations than heretofore and contemplate other changes that shall add to its attractiveness.

Hoping that we may retain our old friends and gain new ones during the coming year, we will wish all our readers a very Merry Christmas and a Happy New Year.

T. S. Van Dyke "An impetuous writer, a prince of sportsmen, and the most picturesque recorder of the California of 'Boom' days," is the description the *Land of Sunshine* gives of T. S. Van Dyke. Among the books which have brought him prominently to notice are "Southern California," which so good an authority as Charles Dudley Warner considered the best book on that theme at the time it appeared; "Still Hunter," "Game Birds at Home" and "Millionaires of a Day," the latter being "an inside history of the Great Southern California Boom." An authority on irrigation matters, and a writer who is appreciated by AGE readers, we give

the following brief sketch of his life, together with his portrait, feeling confident that all of our readers will be glad of a glimpse at the personality of one whom they have so long known through his pen:

T. S. Van Dyke is a native of New Jersey and is about 56 years of age. From a child he was fond of gardening, tree growing, anything connected with out door life in fact, "and was," as he expresses it, "fond of working in the ground with spade, hoe or anything else, provided always that I did not have to." Having this liking for agriculture, it was but natural that, when at the age of 33 his failing health forced him to give up the practice of law and go to California, he should turn his attention to the use of irrigation in farming. He had tried irrigation in New



Jersey and made a failure of it, but during the ten years that he spent in the country regaining his health, he lived among irrigators and on irrigated farms, and there made the thorough study of the different methods which has given him such an intimate knowledge of the subject, and which puts life into his writings. To be thoroughly conversant with your subject is the first requisite to a good writer, Mr. Van Dyke thinks, and he attributes the success of his irrigation writings to the fact that he "learned irrigation with a hoe in hand, still keeps it up and is not a bit alarmed at the sight of a spade."

In 1885 he took up the building of irrigation works as a business, making a thorough study of hydraulic engineering, which he found quite as essential for a promoter as for anyone else if he wants to

know just what he is about. Finding that the handling of water economically and properly after it was on the ground was fully as important as the getting it and that it was folly to spend tens of thousands of dollars to put water into the upper end of a ditch and allow it to be wasted at the other end, he made a study of this feature, both in the United States and Mexico and as a result is probably the best posted man, on *every* question pertaining to irrigation, in the state of California.

Mr. Van Dyke is a resident of Los Angeles and while most of the time is occupied in his own business in engineering he does some expert work outside of it.

This issue contains the seventh paper in the series on "Unprofitable Irrigation Works," that have been running in the AGE.

Land and Products.

In this number of the IRRIGATION AGE we present our readers with the second letter from Wallace Harrington on "Land and Products" and like the first it is interesting and instructive, although the author deals with the subject along different lines. They are both somewhat general in character, leading up to a practical examination of the question from a local standpoint. The articles that are to follow will deal with climatology, temperature, precipitation and sources of water supply which in all that Southwest country is a question of paramount importance, and it is one with which Mr. Harrington is specially qualified to treat. The soils will be analyzed with the view to determine the particular class of crops for which they are best adapted. Cattle ranching and farming, like any other business, to be successful must be conducted on rational lines by rational laws that demand study and obedience. One section of a country may be specially adapted to grazing, another to wheat and kindred crops, another tobacco, flax, hops or canaigie, another to orchards and another to vineyards and so on, therefore the investor or the homeseeker should be careful in his selections in order that the land and conditions are suitable for his particular purpose. And in going to the Southwest the water is as important a consideration as the sun. He

must keep within the rainy line or where there is a visible water supply, for everybody familiar with that region knows very well there are thousands of acres there that are valueless from lack of water. Keep within the rainy line or have a visible water supply and the yield is pretty sure to be abundant and valuable.

An Old Acquaintance Joel Shomaker, the well known western journalist was born in Pendleton County, Ky., Oct. 2, 1862, and grew up on a farm. He was educated in the home high schools and Kentucky State University, and began his journalistic work while attending college. In 1883



he went west and located in Utah, where he has since been engaged as an experimental farmer and gardener, editor and publisher and general writer for a score of prominent magazines and newspapers. He has made the subject of irrigation a life study and is recognized as an authority on all subjects pertaining to practical irrigation. His connection with the AGE began in 1891 and although much of his matter has been unsigned, his contributions have covered the pages devoted to irrigation, farm, garden and orchard subjects.

He served as agricultural editor during the three years the AGE was published in Salt Lake City and is very familiar with

thousands of its readers. In the January number he will begin a series of articles on "Co-operative Irrigation Colonies" and treat the subject of western colonization from a practical standpoint.

During the past fifteen years he has traveled over almost every section of the irrigated west and personally investigated the various systems of individual, co-operative and corporation canals, the result of which will be described in the AGE.

Mr. Shomaker was the first editor of the *Manti Messenger* and was for a time editor of the *Logan Republican*. Besides his other literary ventures he has written four books on irrigation and kindred subjects, his latest work, "The Farmer and Financier—A practical exposition of the principles of co-operation of capital and labor," is soon to be published. About the middle of November, 1898, Mr. Shomaker became editor and manager of the *Farmer and Dairymen*, a weekly published at North Yakima, Wash. Under his able management the publication will probably become one of the foremost weeklies of the Northwest, and the AGE joins with his many friends in wishing him success in this new field.

Secretary Wilson's Report.

The report of James Wilson, Secretary of Agriculture, for the year ending June 30, 1898, has been received and the attention given to irrigation during the past year by the Department of Agriculture, is especially gratifying to all friends of the movement. "All of our country west of the Missouri River is interested in irrigation," says Sec'y Wilson, "and facts are being collated regarding soil moisture, the supply and distribution of water, uniformity of laws and court decisions relating to irrigation, and the requirements of different crops in this regard."

The friends of the irrigation movement secured an appropriation of \$10,000 from Congress for the current fiscal year, to be expended under the direction of the Secretary of Agriculture in collecting statistics and information on the subject of irrigation from agricultural experiment stations, agricultural colleges and other sources. As a matter of economy, researches and the expending of this fund is to be done in co-operation with the De

partment of Agriculture instead of creating a separate division. That will come in time, but we are content to have our cause in the hands of so efficient and interested a worker as Secretary Wilson.

It has been decided by the Department to confine the work on irrigation for the present to two general lines: "The collation and publication of information regarding the laws and institutions of the irrigated region in their relation to agriculture" and "The publication of available information regarding the use of irrigation waters in agriculture as determined by actual experience of farmers and experimental investigations, and the encouragement of further investigations in this line by the experiment stations."

Bulletins to be Published. It will be especially gratifying to the small farmer desirous of trying irrigation, but ignorant of the correct method of using water, to learn that arrangements have already been made for the preparation of several bulletins on irrigation by competent experts, one of whom is the State Engineer of Wyoming, Prof. Elwood Mead, and these bulletins will be published and distributed by the the Department during the present fiscal year. This is of great importance as it will enable people to gain some certain knowledge as to the best methods to be used.

The laws and institutions relating to irrigation, which have grown up in the different communities, are in most cases so unsatisfactory that there is a crying need of immediate reform, and as this is a question of general, rather than local, interest, Sec'y Wilson recommends that it be taken up by the National Government and such investigations be made as shall determine the solution of these many problems.

The Present Work. As already stated the Department has decided to divide the work for the present into two heads. Under the first of these—the careful study of the laws and institutions of the irrigated region with special reference to their improvement—the objects will be to aid the courts in the adjudication of claims respecting water rights; to bring out the defects in the existing laws and suggest

remedies for them; and to assist farmers in securing water rights and to protect their interests in the appropriation and use of water for irrigation. Under the second heading—the publication of the results gained from experimental investigation—it is proposed that the Department take up the carrying on of thorough original investigations along a number of different lines. The agricultural experiment stations in the irrigated regions have shown the way in which these investigations should be conducted, but their limited means have prevented them making very great progress.

In closing his report regarding irrigation Secretary Wilson say: "I believe that the importance and variety of the work demanded in the interests of irrigation in this country will justify a large increase in the appropriation for irrigation investigations by the Department. I hope that at the coming session of Congress a well-defined policy regarding the work of the Department on this subject will be definitely adopted." In this hope he is joined by every friend of the irrigation movement.

The Beam in Our Own Eye. There is a great deal of very natural enthusiasm over the acquisition of new territory by the United States, but there is a serious phase of the matter which is forgotten by many in the first flush of triumph, and that is our duty to these newly acquired colonies. David Starr Jordan, president of Leland Stanford University, Cal., discussed this question in the *Atlantic Monthly* recently and taking Alaska as his theme told of the abuses in that country and pointed out certain lessons that he deemed useful in dealing with other colonies.

Mr. Jordan visited Alaska several years ago by request of our government and may therefore be taken as authority and his statements given due consideration. Alaska's suffering resulted, in his opinion from four causes—"Lack of centralization of power and authority, lack of scientific knowledge, lack of personal and public interest, and the use of offices as political patronage;" the first of these probably being the main one. The natives were incapable of self-government and to force

it upon them was to bring about the sad results that are now before us. Congressional interest was not sufficiently excited in their behalf to pass laws looking to their welfare and questions, vital to her, were never introduced in Congress, while many of the regulations that were passed were never enforced. For as Mr. Jordan says: "What is everybody's business is generally nobody's business, and what happens in Alaska is generally nobody's business." That is the reason why at the present day "starvation is inevitable along the whole line of the southwestern coast." Thirty-one years ago when we purchased Alaska from Russia it had a native population of 32,000; now in many of the villages the entire native population is huddled together in a single cellar, while starvation and want are everywhere. With such a record in our own colony it is a case of the "pot calling the kettle black," to censure Spain too severely for her colonial policy. The same cause is at the bottom of the trouble in both cases.

Says Mr. Jordan "We try to throw the burden of self-government on people so situated that self-government is impossible. We impose on them statutes unfitted to their conditions, and then leave to them the enforcement." As an example, there are laws in Alaska regulating the salmon fishing, etc., but the salmon company would have to arrest and punish itself if it infringes the laws, as the native would not be capable of doing so.

From this one can see how very little provision is made for the enforcement of any laws that may be made and how little the native population is considered.

The lesson Mr. Jordan draws from our Alaskan failures is, that before we accept colonies we must count the cost and that if we *do* accept them we must protect and care for them, foster their industries and look to their welfare, no matter how expensive a proceeding it may be. There are races living under our flag that are at present not capable of self-government, and until they are, some sort of colonial bureau must be established to look after their welfare. The following words of Mr. Jordan should be echoed by every loyal American: "If we cannot afford to

watch them, (the colonies) to care for them, to give them paternal rule when no other is possible, we do wrong to hoist our flag over them." This country has taken a great responsibility in annexing new territory and we echo the sentiments of the writer when he says: "It may be that the final loss of her colonies, mismanaged for two centuries, will mark the civil and moral awakening of Spain. Let us hope that the same event will not mark a civil and moral lapse in the nation which receives Spain's bankrupt assets."

The Clayton-Bulwer Treaty. Editorial mention was made in last month's AGE of the Nicaragua canal project. That we will soon have to have an isthmian canal is generally conceded, on account of our recent territorial acquisitions in the Pacific, but whether it is to be the Nicaragua or the Panama canal is still an open question. The friends of each project are busily agitating their respective canals and both will probably come up before Congress this winter. A question that has come up regarding the proposed Nicaragua canal is whether the Clayton-Bulwer treaty of Great Britain is still in force. This treaty was made between the United States and Great Britain in 1850, the terms being that England and the United States should have joint control over any canal which might be built across the isthmus, providing that Great Britain should on her side pledge herself never to annex any part of Central America. Ex-President Cleveland, during his term of office, considered the treaty as binding, though previous to his administration official notice had been given England that, owing to her having formed a colony in Central America while this country was engaged in its great civil war, she had violated the treaty and it would henceforth be considered null and void by the United States. Different views are taken by public men and by the press on both sides of the water as to the validity of the treaty. *The Spectator* (English) advises that England abrogate the treaty at once, thus removing what might possibly be an obstacle to the construction of the canal—an enterprise whose success means almost as much to Great Britain as to this country.

IRRIGATION IN NEW MEXICO.

JOEL SHOMAKER.

New Mexico comprises an area of 122,580 square miles, or 78,374,400 acres. The Territory was created by act of Congress, Sept. 9, 1850, and in 1890 had a population of 153,593, including 1,956 colored. The official census report gives 4,458 farms owned and cultivated, and 3,085 or about 70 per cent being irrigated. Small farms are noticeable here as in Utah, the average size of the irrigated farms being only 30 acres. The first cost of water right averages \$5.58 and annual maintenance fee \$1.54 an acre. There are sixteen county divisions, possessing similar characteristics, enclosing numerous fertile valleys ranging from 2,000 to 6,000 feet above sea level. Several mountain peaks reach an altitude of 13,000 feet and hold the winter snows in perpetual reservoirs for mid-summer irrigation.

Irrigation has been practiced in New Mexico for many centuries, and in some instances the primitive canals of the native Indians and Spanish invaders of ancient days are yet in use. The principal irrigated areas are narrow valleys along the river banks, where the Mexicans originally owned small individual ditches, taken from the streams by means of temporary dams of brush and rock. The products of these farms include all the fruits, cereals and grasses of the temperate belt, and such semi-tropical plants as oranges, lemons, figs, peanuts, sweet potatoes and cotton, all of which grow in great profusion in some of the warmer sections. The water supply is well distributed and most of the smaller streams are appropriated by farm partnership or co-operative ditches, constructed at little expense, and kept in repair by the labor of the owners. Water is an appurtenance to the land and a proportionate volume is transferred each heir in the division of old estates or the sale of cultivated areas.

In 1890 there were 35,504 families residing in New Mexico and 25,867 families occupied farms, all except 721 being free of mortgages or other incumbrances. The corn crop of this Territory for 1897 was a total of 661,581 acres, which yielded 4,282,648 bushels, and oats 258,795 bushels. In 1895 the official returns gave 2,936,612 sheep owned in the Territory. The average wool clip hardly reached five pounds on account of many natives having a poor class of sheep, but the more enterprising wool growers have the best Merinos and Cotswalds. Stockraising has always been a leading industry in New Mexico and the last official census figures give 7,247,820 as the actual number of live-stock owned by farmers and rangemen. The entire Territory is well adapted to ranges as the tablelands are covered with

grass and rain falls frequently, and the valleys are watered by rivers and streams fed from the mountains.

The markets for irrigated products are chiefly local, but there are nearly 1,500 miles of railroad, including the Atchison, Topeka and Santa Fe, Atlantic and Pacific, Southern Pacific and Denver and Rio Grande system, ramifying every important agricultural and mineral producing district. The soil, climate and other natural conditions make of New Mexico an ideal fruit and vine growing section, and the sugar beets and canaigre roots grow to perfection in this region. A sugar factory at Eddy and canaigre extracting plant in the Pecos Valley insure markets for the tubers. With railway connection east and west, and north and south the native products may be shipped to the markets of the world and compete in quality and beauty with any section of the irrigated realm. Farmers report harvesting \$600 worth of watermelons from an acre in the Pecos Valley, and experiencing no difficulty in finding an anxious market.

All systems of irrigation are practiced throughout New Mexico, and some curious customs prevail among the old timers. The basin system of irrigating trees, consisting of filling a hole with water and allowing that to percolate to the roots is practiced. Some of the Mexicans carry water and irrigate their melon vines by filling boxes or holes near the roots. The old wild flooding method is still in vogue, especially in orchards and meadows. Furrow irrigation is practiced generally by the modern irrigators, though some have sub-irrigation plans and others flood the land occasionally. The soil is so prolific and climate so adapted to plant growth that when water is applied by any means the results are marvelous. Alfalfa produces from three to six crops annually. Trees and vines make a growth of from four to sixteen feet during a season, if well cultivated and thoroughly irrigated. An acre planted to mixed fruits will yield from \$500 to \$2,000 yearly, after the trees come into bearing.

The Pecos Irrigation and Improvement Company has the largest irrigation enterprise in the Territory, having transformed several thousand acres of desert land into a perfect homeseeker's paradise. As stated in the advertising columns of the AGE this company has the soil, climate and water, and men with little capital, plenty of enterprise and active minds and muscles can soon create bowers of Eden in this chosen vale. I have no advertising object in writing this about New Mexico, any more than any other of the series of articles that have appeared in former issues, so the readers must not conclude that because I mention Pecos Valley it is a paid advertisement. But those in quest of cheap lands, abundant water, unexcelled climate and all the natural elements for creating magnificent homes, surrounded by vineyards, orchards and everything that can be grown in a semi-tropic country will do well to look over the Pecos Valley before locating

elsewhere. This water system is intended to irrigate 400,000 acres of excellent land.

New Mexico offers excellent opportunities for the investment of capital in constructing reservoirs for conserving the spring floods, for use on lands now desert. The co-operative system practiced in Utah could be used very successfully in reclaiming large areas and impounding water for irrigation. Individual ditch building is practically at an end as the many small farmers' canals in the Territory and on the Rio Grande in Colorado have appropriated the natural flow of streams. Wells are obtainable in some valleys and the underflow or sheet water may be tapped and lifted by means of windmills or other pumping machinery. Numerous good wells are completed in Grout county and elsewhere and the farmers are still prospecting for better fountains. Much water is wasted through the old Mexican systems of irrigation and some of the natives are very slothful farmers, but men of determination are conquering the deserts and startling the world with the wonderful productions.

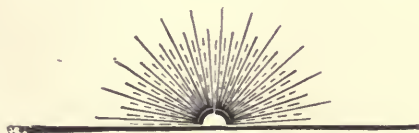
Bernalillo county in the north central part of the Territory has probably 400 irrigators, residing chiefly on the banks of the Rio Grande from which small ditches are taken. The river valley lies at an altitude of about 5,000 feet and produces abundant crops, if properly cultivated. The method of irrigation is almost wholly confined to the old basin and flooding systems. A great waste of water is noticeable in seepage and evaporation from the little basins or ponds surrounded by sand banks. Colfax county in the northeast is devoted principally to sheep and cattle raising, having only a few farmers located near Springer, the chief city. Canals and ditches are small, but increased efforts are being made for additional reservoirs, wells and underflow channels. Donora Ana county in the south-central part has many farmers—over 400—using small ditches and growing a mixed variety of agricultural products. Grant county in the southwest has miners and stockraisers, with some small farms, carried on chiefly by the stock owners. Windmills are used in lifting the under current, one mill supplying water for about five acres of garden.

Lincoln formerly comprised the present counties of Eddy and Chaves and is the most advanced section of the Territory, in having new farms and vineyards, sugar beet fields and everything of modern invention in connection with fine irrigating systems. Here are the towns of Eddy and Roswell and the great irrigation works of the Pecos Valley Improvement Company. Mora county has a large area under irrigation and probably 500 farmers till small fields successfully. The individual reservoirs show the feasibility and value of impounding water in the spring for use in the dry summer months. Rio Arriba county in the north is watered chiefly by the San Juan and contains many Mexican towns and Indian pueblos. The people have good

sources of water supply and on the headwaters of the San Juan some dry farming is practiced. Small storage basins are located at various places, but the rivers are the main sources of water supply.

San Juan in the northwest has many farms at an elevation of about 6,000 feet. Alfalfa is the principle crop, but all kinds of temperate fruits do well, especially along the river bottom. Ditches are small and do not cover the finest land on the mesas. San Miguel county consists chiefly of plains where irrigation canals have not been built. The small valleys are cultivated to a limited extent. Santa Fe county has numerous small farms and gardens along the streams where irrigation is possible by means of small individual ditches. Sierra is mostly mountainous and contains very few small farms. Mining and stockraising occupy the attention of the citizens. Socorro includes much of the Rio Grande valley and contains many small farms. Mining and stockraising are the leading industries. Taos in the north contains quite an extensive area of agricultural land. The native Mexicans own most of the ditches and cultivate land after their ancient patterns.

Valencia contains only small farms along the stream and has not been very much developed. One peculiarity about the old Mexican land holdings is the description of many claims given in yards instead of acres. The land has been divided and sub-divided so often that a farm will be described as "30 yards ditch front and 1,000 yards back to the bluff," thus giving every claimant enough land on the ditch to get his water without crossing another's possessions. Whatever may be said of the old manners and customs of New Mexico the modern canals and up-to-date farmers are all that homeseekers desire. The climate is mild and healthful, the soil rich and productive, water abundant if properly reservoiried and the opportunities for further independence are as good here as in many of the apparently more advanced and better favored western states.



UNPROFITABLE IRRIGATION WORKS.

NO. VII.

T. S. VAN DYKE.

In spite of all that can be said, the fact still stands out clearly, as I stated at the outset, that one of the main things with which irrigation companies have had to contend has been the difficulty of getting settlers. The stupidity of companies about this has been wonderful, but even the most judicious management has found it uphill work for several years past, growing steadily worse up to the last year or two.

The main cause of it is due to the idea that farming is unprofitable; that a country life is dull and slow; that farming is good enough for those who know no better, or can do no better, but is not the thing for the boy of the family, who must be something better than his father was; that it is not progress but rather setting one back in the world and making him a laughing stock under the name of "hayseed" or something else.

While these ideas have been growing there was a boom over a great part of the farming sections of the west due to the opening of the great prairie region since the civil war, the vast production of wheat with little competition in the market of the world, the growth of the country in population and wealth which had no equal in history so long as any government land in the good rainbelts was left, and upon that the influx of foreign capital in such great amounts some fifteen years ago.

Kansas and California were the storm centers of the culmination of this boom, but it raged more or less all through the west and found people in the country almost as ripe for it as those of the towns. For many years we had been taught, indirectly but quite plainly, that we, the people of the great United States, were an exception to all known rules that govern the human race. Of course a Mexican farmer cannot enjoy this and that luxury. He is only a peon. Of course a farmer in Europe cannot. Is he not a peasant? Surely a farmer in India cannot. Why, he is only a ryot. But the American farmer can have this and that and the other thing, of course. For is he not an American? Of course he can have luxuries, and the progress of our country on the great upward road, which it is to travel forever at an ever increasing pace, is measured by the town lots, pianos, fine carpets, fancy buggies and other things which are the true heritage of the American farmer.

It was a sad awakening to find there was some mistake about

this, that we no longer had the monopoly of the wheat of the world, but that cheap labor was using against us the fine agricultural machinery which we thought we were so very smart in selling and showing how to use. But this and the fall in other produce in sympathy with wheat merely cut into the farmers's surplus. It did not cut into his living. The absurdity is in supposing that he was the only sufferer. The real sufferers were those into whose living the change cut, and their number was greater than that of any farmers who were much affected. They never had any surplus to reduce. They never had more than a living and that was reduced, while the farmer's living was the same as before. Call silver the cause and we do not affect this fact.

Suppose the world consisted of three people. It is easy to see how one of them may get the surplus labor of the other two, and two may get all the labor of the other one. Or all three may make merely a living by their own labor and none of the three have any of the surplus labor of the rest. It is clear enough that if one gets above the average, one or more must drop below it, and the only way to avoid this is for each to be satisfied with turning his own labor into food and clothing. The chances of success are far greater in this, for the moment one tries to capture some of the surplus labor of one or both of the other two, he is increasing his risk of failure. And failure may leave him worse than where he started and one or two of the others may have the whole of his surplus. This is often very simple. Suppose A thought himself a fine poker player; B thought himself an extra fine player; whereas C did not think anything about it, but *was* a super-exera fine player. A makes a start for the surplus of the other two, B does the same and they wind up by C getting the whole of it.

For surplus labor let us now substitute money, for convenience in making the exchange. Have we changed the conditions? Can it alter the consequences of a mistake of A as to his smartness and the mistake of B as to the stupidity of C? Will any amount of money make any difference or any kind of money?

Do we escape these conditions by increasing the number of people or do we merely hide the machinery with numbers? Must there not be a vast number of men satisfied with making a living, a great big average man who neither climbs above nor falls below? Is not every attempt to climb much above liable to result in a drop below? Is not every attempt to secure much of this substitute for surplus labor dangerously like a game of poker, in which you may easily be mistaken about your ability or your watchfulness? And as long as you allow people to get in any way the surplus labor of others (or its representative, money) how are we to prevent the long-headed, the energetic, the economical from being ahead; especially if they walk the floor when the rest are sleeping?

The great mistake of the farmer is in supposing that he is the only average man. He thinks the majority of men in business and the professions of all kinds are making money while he is making only a living. But they are all struggling first for the surplus labor of their fellows in order to convert it into bread and clothes. The farmer turns his labor into bread directly, wherein he has an advantage that he little realizes. The great majority of men in business do not, except during some very exceptional boom, make more than a living, and fully one half of them fail to do that. They are eternally shifting from one failure to another, living off their creditors most of the time, adding to the burden of the next financial crash that is due in the course of things. A very few make far more money than it is possible to make out of the ground, but these are not three per cent. of the struggling mass. The great majority of those who make more than a living make no more than is made *in all states and in all times, even the hardest, by a few farmers who are thorough business men.* On the other hand the proportion of farmers who fail to make a living where they work for that first is amazingly slight and due either to poor conditions, poor soil or lack of rain, or something of the sort, or poor health, which cannot be charged up against farming. The conditions that can throw a man in business are far more numerous, and every year narrows the margin on which it is done, so that greater business talent, more unremitting attention, more grinding economy are necessary to make even a living as the country grows older and competition more fierce. But the farmer sees men wearing good clothes and driving around in fine buggies and buying cigars in the nickel-in-the-slot machine and thinks they have a fine time. Simple soul. Half of them are dead beats putting on style at the expense of their creditors. Of the half that are honest two-thirds are walking the floor wondering how they are to pull through when the farmer is soundly snoring. No wonder. They are struggling against friction. The great fight is for food. Instead of turning it out of the ground with one wheel they are running two wheels playing on each other, with the sand of competition in the bearings instead of grease. They have first to get money which is someone else's labor—a hard task for the average man and one that will always be so. In this they are face to face with the fierce opposition of every one else in the same business and with many that are not. But in getting food without money there is no competition. And this is why forty years ago it was a maxim that the farmer is the most independent of men. Too many have drifted away from the old anchorage and made haste to get rich by expanding more sail. So great was this temptation that ten years ago the Kansas farmer could not get rich fast enough on his own boom, but had to come to California to buy town lots. Much talk has been made of the mortgages paid off in Kansas last year. What business had

farmers on such rich soil with such a load of mortgages? Most of them were old ones and any man who was in California during the great boom can tell where much of the borrowed money went.

On the other hand, in states like Minnesota, Iowa, and Wisconsin, where they never have had any booms, except in a few towns with which the farmers did not meddle, the farmers have felt the late hard times less than any other class. All have suffered some, but the farmers less than any—that is, farmers who farm, as most of them do there, in the old style with mixed industries and farming for a living first and money afterward.

The farmer often thinks he is injured because he cannot put on some of the style of the city. He little thinks that he is lucky in being free from it. To command his respect when he comes in town to consult his lawyer, his lawyer has to spend a hundred dollars a year or more for white linen and starching, etc., and still more for good clothes. But that farmer can come in to consult that lawyer in old overalls and a flannel shirt and be as good as any other client.

I may be a poor judge because, from my earliest days, I hated the town and loved the country. I was raised on the edge of town among the farms in New Jersey and as soon as school was out skipped for the woods and fields. I have spent about half my life in the country, and for nearly ten years have lived sixty miles from even the smallest village. Few have had my opportunities for knowing how people live in both town and country, how they make their money and for what they have to spend it, for there are very few equally at home in both town and country. Within my observations, the average farmer is far ahead of the average city man in everything that goes to make life comfortable and pleasant. He can not make the money made by a very few in the city for there is no such thing as great wealth from farming. But on the other hand, there is no such thing as the great poverty of the city. Though the farmer cannot make the lofty flight above the average that some men of great foresight and diligence, and often luck, can make in the city, he cannot drop much below it except through ill health or some misfortune that would set him much farther behind if he ran the race of life in the city. Many a farmer can rise a little above, and some drop a little below the average, but none are very far below it. In the city the number of those who are far below it is vastly greater than in the country.

Quite as great a mistake is it to suppose that those who are far above the average are to be envied. The rich are the most unhappy of mortals. Their troubles are far more intense and far greater in number than can be conceived by those who are content with a plain living. Should the farmer grieve because he cannot try it for himself? He has no more reason to grieve than I have. The world says to me "If you will spend so much time in hunting and fishing, so much

in reading and traveling about looking at irrigation works and other nonsense that uses up time, you cannot have much of our surplus."

To which I reply, with many another, "To the deuce with your surplus, I don't want much of it at the going price. I like to sleep while you are walking the floor. I like to pull a trigger while you are pulling a friend's leg and cast a fly on the whirling water while you are casting your accounts to see if somebody is not going to leave you in the lurch on your interest for the month. I have no relatives praying for my translation to a better sphere and don't have to be a slave in my own house to a lot of servants who would look at me in horror if I should venture to help myself to my own victuals without waiting the requisite period in a swallow-tailed coat."

This is the independence of the farmer, and he ought to be proud of it. But there are many who think work is not exactly respectable and some even think it degrading. At one of the last presidential conventions two years ago, a delegate from Texas deploring the dreadful state of the country, "with tears in his eyes" told another how his daughter, "a lovely girl, had to help him pick cotton" the year before. We are not informed as to how many young men this "lovely girl" could dance off the floor on a long winter night; but as no point was made on her health it is fair to presume there was no suffering of that kind. Lovely women in New England and many states have helped raise a family by picking cranberries and other berries, husking corn and a score of things within the limits of their strength, and no one ever sniveled over it. Twenty-years ago, during a spell of impecuniosity caused by loss of health and business, I worked four months for my board. I could only do half a day's work and light work at that. Yet I did all the irrigating on a seven acre orchard and a garden. I did not feel at all degraded or in any way hurt. On the contrary, it was good for my health and I would do the same again tomorrow rather than contract debts for board that I did not see my way clearly to pay. All notions that work in the ground is menial are un-American in these days; however sound they may have been in the south in the days of slavery. Working the ground where it does not exceed one's strength, a matter generally within one's control, is far less disagreeable than nine-tenths of the daily cranks on which one has to grind from twelve to fifteen hours in the city to get a living no better than the farmer has, but with far more annoyance, risk, insomnia, dyspepsia, Bright's disease and a score of things of which the farmer knows almost nothing.

The last census showed some seventy per cent. of the farms of the United States free from mortgage. There is not a city of any account that can show fifty per cent. of its lots free from mortgage, and plenty have less than twenty five. The difference in the struggle for existence between city and country can be seen in a dozen other ways

to one who will read the ways of men. But people look only at the men in fine clothes and fine buggies with reserved seats at the show and drinking fancy drinks at eleven and think the whole town is making money.

During all the hard times the farmers have suffered less as a class than any other class, that is, *farmers who farm*. Farmers who speculate are no different from other speculators. And the farmer who farms exclusively for something to haul miles to market to sell for money with which to buy food to haul back home to eat is not a farmer but a speculator. He *never did succeed* in the history of the world except for short periods, on some exceptional product. He is up to day and down to-morrow. The true farmer does not play eagle to day for the fun of playing gopher to-morrow. He finds it better to play plain jack rabbit and keep on the surface all the time. If he does happen to fall through some mischance he does not make much of a hole in the ground. But under any and all conditions he can keep afloat longer without angel's wings than any other member of the community.

This is true of the common farmer but far more so of the irrigating farmer. From all quarters of the west have come the same reports about this class. In California and Arizona they have laughed at the hard times. In many places they have felt them some, but in most places not at all. Thousands have made money right through it all, and whole sections like Orange county in southern California and Salt River Valley in Arizona are well worth a study by any one who wants to know what true independence is. Take five, fifty or five hundred farmers as they come, and compare them with an equal number taken at random in the city on the best street, and the comparison would be ridiculous. The same industry and business capacity that will ensure a living in the city will ensure a surplus in the country on the irrigated place, and that is why we find the banks in all these sections full of farmer's money.

The complaint will find its own remedy. It is already doing so. Already the real estate agent is tilling the soil that but a few years ago he was trying to sell to someone else for a commission. The curb-stone broker is folding his tent and quietly stealing away to where he can make living directly and certainly. The sweet-voiced promotor is following suit and learning to dig in the ground instead of in the pocket of some stingy capitalist. The man who started the fifth grocery on the same block because his dear wife wanted "society" is growing tired of seeing all the folks go to his rivals while the only profit he can figure out after cudgelling his brain till ten o'clock over his books, is the difference in the retail and wholesale price of the canned stuff on which he lives as a matter of economy. The man who moved into town to educate his children, on the prin-

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ciple that some men have in going to the circus "to take the children," is beginning to wonder how the algebra and latin they are alleged to be learning at the great high school will help them make a living any better than the stuff taught at the country school. And then, too, the man who had that great genius of a boy that he had to bring to town to "give him a chance in the world;" what a dreadful thing it is to find that so many other farmers have a boy equally smart, if not more so!

Alas! here is the main trouble after all. Each one of us thinks he is one out of a million. The deuce of it is *he is*. There are a million others just as smart, many of them a great deal smarter and thousands of them more active. In the city we meet competition at every turn. The only man who is free from it is the man who has a good piece of land and works it directly for a living first and a surplus afterward. The competition he meets in struggling for the surplus is nothing beside that which the city man meets in struggling for the living. And in the struggle for the living the farmer has no competition. And where he has a good piece of irrigated land and will work it with one-half the industry and business capacity necessary to make a sure living now days in a city of any size, he cannot fail to make both living and surplus. And if he has good land and plenty of water the surplus he will make will be greater than that of the average surplus made in the city. The politicians may talk to the contrary as much as they please, the testimony comes too strong from every irrigating settlement in the west. The farmer is not suffering as much as the rest of the community, and the great majority in the irrigating sections know nothing different from the best years before the late depression.



RECLAMATION OF THE ARID WEST.

BY A. C. ROMIG.

The uncertainty of crop results in the arid and semi-arid regions of the West, by reason of unfavorable climate conditions and inadequate rainfall at crucial periods of crop development, suggests the problem of redemption and whether it be not possible to mend this condition by artificial means and promote a more generous and timely precipitation.

It is conceded that if a duplicate of Lake Michigan were placed in the center of the area bounded by the longitude of Kansas City, the Rocky Mountain range, British America and the Gulf, there would be increased humidity, evaporation, dews and climatic conditions analogous to Missouri or Eastern Kansas. But in default of any such basic source for evaporation what is the remedy, how shall we find a substitute? Manifestly by the conservation of storm waters impounded in a system of artificial lakes, catch basins, storage reservoirs and dams on the farm.

This is the conception of a system outlined by Major Powell, late director of the United States Geological Survey and by him recommended to Congress as a panacea for the evils of aridity and as a restraining factor and permanent relief from disastrous flood calamity on the lower Mississippi and streams traversing the arid regions.

It is a self evident fact that so long as the present status exists, and storm waters are permitted to flow unrestrained, depositing millions of tons of silt on the bed of the lower Mississippi, lifting it higher and higher above the surrounding plain—until a vessel seems to be floating in mid air, just so long will flood calamity result, entailing enormous and constantly increasing expense for repairs.

The timely suggestions Major Powell have borne good fruit. Congress in 1888 voted \$100,000; in 1889, \$250,000 for surveys, topographical maps; segregating and locating storage reservoir sites for impounding storm waters. Of the 147 sites selected by the Coast and Geodetic department in 1890, 33 are in California, 46 in Colorado, 27 in Montana, 39 in New Mexico and 2 in Nevada. The aggregate sites selected since 1889 will approximate 400, including four or five artificial lakes on the upper-Mississippi.

This work of the Coast and Geodetic department is preliminary to the great scheme of redemption. The construction of dams, embankments, canals, and laterals for irrigation facilities remains for future development and it rests with the people of the arid region to work up an interest and arouse an enthusiasm that will culminate in fruition.

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How shall this be done? We answer by agitation; by making it a political issue, incorporated in our platforms and proclaimed from the rostrum. Let the state encourage the construction of ponds and basins on the farm by a measure of tax exemption, or other reward to the individual farmer. Let our representatives in Congress press the matter of appropriation for the heavier work to a finish.

It is a fact of mathematical demonstration that if fifty per cent. of the enormous sums expended on the lower Mississippi (supplemented by state and local aid) was diverted to restraining flood tides on the water shed of arid regions, the flood disasters of the lower country would be reduced to a minimum and the expense of repairs be correspondingly lowered.

That an effort to so divert and portion off the natural revenue would encounter determined opposition on the part of contractors and those who have profited and grown rich off flood disaster, is a foregone conclusion. And the pessimist, appalled at the magnitude, the expense and opposition, will decide that the scheme of redemption is impracticable and cannot be accomplished.

But in the language of Daniel Webster on Bunker Hill when he requested the marshall to keep back the crowd and received for answer, "It cannot be done, it is impossible," exclaimed in lionion voice "There is nothing impossible for Americans on Bunker Hill." So of the giant West. There is nothing impossible when all unite on a great economic question of national importance.

We must agitate; we must agitate if we would escape the calamity of protracted drouth and secure a maximum of agricultural results; or must be content with doubtful results and conditions of uncertainty that belong to lottery; either this or we must relegate to pastoral pursuits and sparce population the vast area of arid America.

When the Grand Artificer of the universe carved out of chaos this magnificent domain, there was no purpose to relegate it to the Texas long horns and the festive cow-boy with a population of five or ten to the square mile. But rather under a system of intense culture, small holdings and irrigation to become the home of many millions of happy prosperous people, working out the problem of civilization along Christian lines of jurisprudence, as outlined by the great Master, earnestly striving to eliminate crime, poverty and misery; to promote virtue, thrift and happiness, until every heart shall throb with a divine impulse, and everybody shall see,

"Tongues in trees—
Books in running brooks,
Sermons in stones
And good in everything."

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs, Also sketches or plans of convenient and commodious barns hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us improve the appearance of THE AGE?

LAND AND PRODUCTS—AN EXHAUSTIVE ANALYSES.

No. II.

PRODUCTS OF THE SOIL.

According to promise I will devote this letter largely to the ordinary products of the soil. In many countries the farmers depend on one or two varieties as money producing crops. In the warm climate of the southwest the varieties are greatly enlarged. There they produce all the crops common to the temperate and semi-tropical climates and in her virgin soil the yield is much larger than in the exhausted soil of the old settled regions. In favored localities out there wheat will average 40 bushels to the acre. According to the official report of the Department of Agriculture at Washington the average yield of the older states in the Union runs from 7.9 to 21.5 bushels, or an all round average of 13.4 bushels an acre. Oats in the virgin soil of the Southwest will average from 70 to 75 bushels and sometimes run as high as 90 bushels an acre, which is quite a third more than the yield in the East. Corn yields about the same as oats; barley, rye, peas also yield about a third more in the Southwest than in the East. Potatoes average from 8 to 10 tons to the acre and the whole line of vegetables keep pace with potatoes. Alfalfa averages 6 tons an acre. All tame and wild grasses thrive and yield well.

Sugar beets excel not only in quantity but in saccharine matter, ranging much higher than in Europe. According to figures at hand the world's total sugar production in 1896 was 7,000,000 tons, of which 60 per cent. was from sugar beets. As an illustration of the rapid growth of the industry we note that in 1887 the United States produced 400,000 pounds; in 1888 we produced 3,600,000 pounds; in 1889, 6,000,000 pounds; in 1890, 8,000,000 pounds; in 1891, 43,000,000 pounds and so on up to the present writing. Last year California alone produced that amount. Nebraska comes next with 6,970,780 pounds, and other sugar producing states follow with smaller lots. In the old world they produce 7 to 8 tons of beets to the acre, but we produce 20 tons and often more. In the old world the laud is enormously high in price; here in the Southwest it is cheap. There the average is from 7 to 9 per cent saccharine matter; here it is from 17 to 20 per cent. The average price of beet roots here is from \$4.50 to \$5.00 per ton.

The Southwest is the home of the canaigre plant. In Mexico, Texas, New Mexico and Arizona it grows wild, but produces much more and a better article under cultivation. It is in constant demand in the markets of Europe and America for tanning leather, as it is much better than the barks and other substances

heretofore used. A comparison of the amount of tannin contained in canaigre and other materials used in tanning shows its superiority over all others.

Canaigre root,	26.30 per cent.
Oak bark	7 to 20 per cent.
Hemlock bark	13.92 per cent.
Sumac	16 to 24 per cent.
Wattle bark	20.00 per cent.

When properly planted and cultivated the yield runs from 25 to 30 tons to the



The Canaigre Plant.

acre of green roots which when dried will weigh about one-half of the green product and it has Europe and America for a market. The value of the crop averages from \$225 to \$250 an acre.

There are now approximately 2,000,000 acres of land devoted to the culture of tobacco, and it is doubtful if any better tobacco is grown in any country than that of the Southwest. This remark will be better appreciated when it is remembered that before the recent war with

Spain tons and tons of tobacco were annually shipped from Connecticut to Cuba and there metamorphosed and then re-shipped and imported into the United States as the genuine Cuban article. The force of the imagination is strong in the use of tobacco as well as in the use of some other things. It is a fact that many quite important American citizens prize the merits of a cigar by the price they pay for it, rather than from any other reason. The total world's production of tobacco in 1897 was 1,330,000,000 pounds, of which gross amount the United States produced 550,000,000. The annual increase in production is large and it can be grown and manufactured in the Southwest in equal excellence and perfection with any country in the world without the aid of imagination.

The Southwest is pre-eminently a fruit country. Apples, pears, peaches, plums, apricots, prunes, thrive and ripen to perfection. But the grape excels either for the table, raisin and wine. Most of these fruits will not grow in the North or East in anything like commercial quantities, hence the Southwest is particularly valuable as a fruit country and here many fruits grow wild.

Hops, broom corn, flax and ramies grow abundantly and mature well, and the culture and manufacture of American silk is becoming an important and lucrative industry. The reason of this is found in the demonstrated fact that the sun and soil in particular localities in the warm and equable climate of the Southwest is particularly adapted to the production of the raw material and experience teaches the transposition of this raw material into a high grade manufactured article is here as complete and perfect as in any country. But a few years ago American silk found no market at home, because of a foolish prejudice against it; buyers insisted on the French article or that made in Belgium or Switzerland or perhaps Japan or China, but all that "foolish prejudice" is now happily a thing of the past.

forgotten to be remembered no more forever. An expert on the silk subject recently placed himself on record in the following language:

"American silks of certain grades are just as good as those made abroad, and a good many of them are better. It was formerly necessary for shopkeepers sometimes to pretend that silks made in America were imported, but it is becoming unnecessary nowadays, as women realize the excellence of the goods of home manufacture."

In 1890 the value of American manufactured silk was \$69,154,599. In 1898 it had increased to \$92,677,710, while the value of imported silk on June 30th, 1898 was only \$23,523,110, or about one-fourth the value of the American article. In a few years more we will be exporting silk across the water as we now are exporting a multitude of other American goods.

Assuming that we devote 10,000 acres to the production of these various crops, some of which will far exceed \$100 an acre, some will fall below \$50 and others below \$25 an acre, but they will make an all around average of \$50 an acre. To be within the mark of reasonable certainty we will fix the average at \$40 an acre. At that figure they will give us an aggregate of \$400,000 a year to add to the ranch profits, or more than 10 per cent, of our capital.

Now all the products here mentioned are in universal use and therefore in universal demand. America alone has a population of 70,000,000' calling for supplies of every one of these articles and beyond the home-consumption the markets of the world are constantly calling for them, and this call will be increased from year to year.

This position leads me to briefly note the general exportation business of the United States. Twenty-five years ago we stood fourth as an exporting nation, now we stand second, England only leading us as the subjoined figures prove:

	Amount of Exports.		Rank.	
	1872	1896	1872	1896
England.....	\$1,235,200,000	\$1,422,000,000	1	1
United States	430,583,000	1,050,692,000	4	2
Germany.....	559,700,000	994,156,000	3	3
France.....	726,066,000	656,393,000	2	4
Russia.....	270,586,000	513,908,000	5	5

Before another year passes away the United States will change positions with England and lead the world as an exporting nation.

The above figures run over the fiscal year 1897, ending on the 30th of June that year. In the fiscal year ending June 30th, 1898, we increased our exportations \$180,637,766, making an aggregate for the year of \$1,231,359,766. At this ratio of increase we will pass England and lead the world as an exporting nation in two years.

A noble old Roman general declared that wars were won by wheat. Well, that may have been true in his day, but however important a part wheat plays in the affairs of the world, all will admit that meat pretty evenly balances the scales. In 1897 we exported 79,562,020 bushels of wheat, valued at \$59,920,178. During the same period we exported cattle and the products of cattle to the value of \$83,371,988.

We read a great deal in the newspapers of the day about the wonderful production of gold. Last year was a record breaker, the yield being \$57,000,000. But the gold coin brought into the country in return for cattle exportation and distributed among the people was a third more than the yield of the mines. Such facts must be noted in order that a proper appreciation of the value of the cattle industry may be gained.

But notwithstanding all that has been said we must not imagine that every man is fitted for or can carry on the cattle business successfully; There are a multitude of things to be considered, among which are good judgment, experience, industry and economy. At the very threshold the selection of the land is most important, both or the climate, the water,

he character of the grass and other crops as well as for the condition and probabilities of rapid rise in value. Many of the great fortunes the world over have been won from judicious investments in real estate and the opportunities are as good today as they ever were, and in the case of a cattle ranch the land is paying you a high annual interest while it is growing in value.

The Englishmen and Scotchmen who have been so successful in the cattle business in America have made their purchases of land chiefly in the South and Southwest, and this to avoid the blizzards, the deep snows and the rigorous winters of the North that are so prejudicial to cattle breeding and raising. And now the popular trend is in that direction for general farming and live stock.

In all that I have said I have kept far within the line of facts and by this short story relating to climate, sun, soil and manifold productions, I have explained why the aristocracy of England have bought and continue to hold 20,000,000 acres or more of American land. There was no other way for them to invest their money to equal advantage, equally sure and remunerative, and there is no avenue now open for the investment of American or European money, enterprise and industry that is at all comparable to the virgin land of the Southwest. We cannot reasonably complain of the English aristocracy for acting sensibly and making the most of conditions. But we can avail ourselves of the blessings that God has showered upon us with such bountiful hand.

As Texas is now occupying an unusual share of public attention, especially amongst immigrants and home seekers, it may be interesting to examine, generally, its chief characteristics and finally lead up to some local conditions and so consistently determine whether or not it is a promising and desirable country for settlement. Official figures place its area at 260,901 square miles of land and 3,310

square miles of water surface, consisting of lakes and bays, making a total of 264,211 square miles, equal to about 8.7 per cent. of the entire area of the United States and territories. It is much the largest state in the Union, being six times larger than New York and seven times as large as Ohio, and 100,000 square miles larger than all the Eastern and Middle states, including Delaware and Maryland. Compared to the countries of Europe it has 34,000 square miles more than the Austrian Empire; 62,000 more than the German Empire, and nearly 70,000 square miles more than France. And yet Texas has only 2,235,523 inhabitants and less than six per cent of the area is in cultivation. If Texas had the density of population that Illinois has, it would have 14,650,000 inhabitants; if as densely populated as New York it would have 26,750,000; as New Jersey, 63,800,000; or as Great Britain and Scotland, 85,422,000 inhabitants.

It has a wider range of climatic conditions than any other state in the Union except California and a greater variety of valuable products than any of her sister states.

It is located between the 25th and 36th parallels of North latitude and the 94th and 106 meridians of longitude. The distance between the extreme northern and southern points is nearly 750 miles, and about 800 miles from east to west. General custom has divided the state geographically into five parts, namely: Central, Northern, Southern, Eastern and Western Texas, but the dividing line is imaginary and not well defined.

The State Commissioner of Agriculture describing its topographical characteristics says "that portion of the state lying east of 96th degree of longitude and north of the 30th parallel of latitude, and known as 'East Texas' is characterized by a long range of hills running in an irregular line from northeast to southwest, containing large deposits of brown hematite iron ore. It is also marked by a heavy growth of

THE IRRIGATION AGE.

timber, consisting principally of forests of pine, oak and hickory."

That portion of the state lying east of the timber region and north of the Gulf coast is a vast open plain, composed of gentle rolling prairies and gradual elevations. It is covered with a luxuriant growth of native grasses and dotted by an occasional mass of timber, and extends to Red river on the north and the mountains ranges on the west and northwest. The water courses and ravines are usually fringed with a growth of hackberry, ash, elm, cottonwood, pecan, walnut and the various oaks.

In the extreme northwest, bordering Kansas on the south and New Mexico on the west, is the elevated table land designated as the Panhandle of Texas. On a line north of Austin and San Antonio and running in a southwesterly direction, there is a low range of hills that mark a change in the topography of the country. Westward it is more broken and the elevations more abrupt. The valleys are broad and the lands very fertile. The soil is described as of greater variety and richness than any other state in the Union. The Commissioner says: "The black waxy, black sandy, black pebbly, hog wallow, gray sandy, red sandy, sandy loam and alluvial soils are each to be found in the state, the majority of them in greater or less quantities in each section." But the principal soils of Texas are the black waxy, black sandy and alluvial lands of the river bottoms.

We often hear Texas spoken of as a vast timberless country, but that impression is wholly erroneous. In the prairie region the bottoms along the streams and ravines are skirted with timber, and in most places there is a happy admixture of prairie and timber land that so delights the heart of the farmer. Besides this, portions of the state are covered with a dense forest of fine timber, embracing nearly every variety grown in the south, aggregating 35,537,967 acres of timber land.

Texas has a wide range in her climate as well as in her productions, it is in fact this wide range of climate, rich soil, fervent sun and pure water that gives her so wide a range of productions. In addition to this it has often been suggested that Texas should become a health resort as well as a refuge for people seeking to escape the rigors of winter in more northern latitudes.

Schools, churches and newspapers constitute an infallible standard by which any country or any people can be judged and the character and convenience of the schools is always a paramount question to every home seeker. In this Texas takes first rank, her school endowment is, I believe, much the largest of any state in the Union, embracing \$7,500,000 in interest bearing bonds, \$14,000,000 in interest bearing land notes, and about 23,000,000 acres of unsold lands. Of the unsold school lands 20,000,000 acres are leased at 4 cents per acre, and the funds thus derived added to the annual available school fund, aggregates a total state and county fund of \$73,454,868.

In the face of such facts as I have presented in this and a former letter we are still reaching out and annexing new territory in the Eastern as well as in the Western hemisphere. Some of these come by gift, some by purchase and some by conquest. But if we examine all, the old and new, from the Penobscot to the Yukon, none of them can offer to the honest industrious young man any more, or even the same, inducements that Texas does. Here we have unequalled climate, rich soil, with a guarantee of seed time and harvest for all our products, and our location is central, with not only desirable ocean service, but railroads radiating in all directions, affording cheap and rapid transportation to the markets of the world.

Eastern people don't appear to understand existing conditions in Texas; they don't realize that during the past fifteen years the state has been filling up with the best blood of the East and South; the

young, robust and ambitious of those sections have gone out and settled in the West, bought land and planted vineyards and orchards, cotton and tobacco, wheat and corn, herded cattle, sheep and horses; they have plowed and sowed and reaped and gathered into the garner of the husbandmen; they have been frugal and prospered, and as a result towns and cities have sprung up; in answer to the demands created all sorts of industries have been established and new avenues opened for the safe and lucrative investment of labor and capital. That is the class of popula-

A DAIRY SCHOOL.

The Kansas State Agricultural College at Manhattan, Kan., will begin its second annual Dairy school Jan. 3, 1898, and continue it until March 25, 1899. Kansas is a state that has first class conditions for profitable dairying and it is estimated that 30,000 farmers within the state send milk to creameries and cheese factories. It is, therefore, quite as important that instruction should be given in dairying as in other branches of farm work and realizing this the Agricultural College has opened a way by which the farmer may



tion Texas wants; there is room enough and to spare for those who are willing to toil to accomplish something every year as they go along, create wealth and all its desirable accomplishments and so systematically benefit themselves, the state and the nation.

In my next letter I will treat of local conditions as I find in those portions of the state that I may visit.

WALLACE HARRINGTON.

In the Cuban election, if an American meal ticket was put up it would sweep the island.—*Journal, Minneapolis.*

become posted on dairy subjects at very little expense.

Tuition is free, the only expense being for books, blank books, and suits. The total expense of the term, exclusive of railway fare, may be made as low as \$40 for the term, board and room being furnished at \$2.50 a week and upwards. Any person over 18 years of age, of good character and of sufficient intelligence and education to understand the lectures given may be admitted without examination. The school has a model private dairy with the best forms of apparatus for handling milk and making butter and a herd of dairy cows

The course of study is divided into seven divisions: Principles of Agriculture—Treating of soil, crops, etc., and the managing and equipping of Kansas dairy farms; Dairying—The secretion, nature and composition of milk, the causes and conditions affecting its quality and quantity, handling of milk, butter making, etc., etc.; Bacteriology; Feeds and Feeding—The effect of common feed stuffs on the character and yield of milk and butter; Breeds and Breeding; Diseases of Dairy Cattle—Common ailments, symptoms and remedies; Butter Making and Milk Testing.

From this brief outline some idea may be gained of the plan of instruction and the practical knowledge thus obtained should recommend it to every farmer. The value of an education in this line is beyond question, as a thorough understanding of the proper feeding, selecting and managing of cattle, together with knowing just how to handle and care for milk and butter, means a gain in dollars and cents for the farmer.

Mr. Thomas E. Will is the president of the Agricultural College and will gladly give further particulars. The dairy course is intended for private dairymen only, as the college does not possess facilities for giving instruction in creamery or factory work.

The accompanying illustration shows the barns and sheds of the college.

AGRICULTURAL SCHOOLS IN FOREIGN LANDS.

The following is a brief outline of the work and course of study of the agricultural schools in Egypt and Australia. As the information was gained by the United States Department of Agriculture from documents sent by the above countries, it is of course authentic.

In Egypt the School of Agriculture is located at Ghizeh and during the four years' course the following studies are taken up: practical and theoretical agriculture, agricultural chemistry, natural

science, theoretical and practical chemistry, farm bookkeeping, land surveying, hydraulics, veterinary science, physics, arithmetic, algebra and geometry, trigonometry, Arabic language and English language. Eight hours a week throughout the course are given to practical exercises in agriculture. Each pupil is allotted a plat of land which he must cultivate with his own hands, "the employment of hired labor or other assistance being absolutely prohibited." This plat consists of one-quarter of a feddan (1.038 acres) the first year, half a feddan the second year, and three-fourths the third and fourth years. "Every pupil shall be allowed to dispose of the produce of his plat, subject to the approval of the principal."

To be admitted to the school the pupils must be at least 14 years of age and must pass an entrance examination. The annual fees for tuition and other expenses are \$75 for day pupils and \$125 for boarders. The fee for day pupils covers the cost of a mid-day meal provided at the school. Pupils may be admitted to the school free of charge, at the discretion of the minister, provided they are in needy circumstances.

The instruction in theoretical agriculture includes such subjects as soils, climate, tillage, manuring, the feeding and breeding of farm animals, dairying, culture of different crops, construction and sanitation of farm buildings, and agricultural implements. Special attention is given to irrigation and the culture of crops especially suited to local conditions, among which are rice, cotton, sugar cane, berseem (Egyptian clover), beans, wheat, barley, maize, peanuts, flax, potatoes, sesame, indigo, fenugreek, chick-peas, and alfalfa. Sugar making and the extraction of cotton-seed oil and indigo are also taught. A special topic is the treatment of the salt lands in upper and lower Egypt, including washing, reclaiming and cropping.

In Australia the school is located at Richmond, forty miles northwest of Sid-

ney and is known as the Hawkesbury Agricultural College. It is a flourishing and practical school owning a farm of 3,500 acres of poor soil and two other fields of richer soil.

At Richmond the teaching force consists of a principal, science master, farm foreman, experimentalists, orchardist, dairy instructor, carpenter, poultry and bee expert, blacksmith, baker, and engineer. The plan of the college is to thoroughly weld science and practice. Students pass from the lecture room direct to the microscopic hall or to the chemical laboratory—studying one day, busy in the field the next.

One hundred students fill all the available dormitory rooms, each paying \$125 per year for his subsistence and giving his toil for his instruction. In case of sickness an hospital and a trained nurse are available.

This college presupposes that every farmer must know how to produce everything necessary to self-support as a farmer, even though he is engaged in specific lines of agriculture, hence every student is instructed practically in all fundamental processes of farming. Crop production; stock breeding and raising; milk, cheese and butter producing and marketing; fodder production and storage; scientific feeding of animals; manure production and manufacture from bones; purchase, protection, and repair of farm implements; experiments with new and with rotated crops; poultry, bee and fruit economy, all find a place in the curriculum of this flourishing institution.

Ample stables and machine shops, silo and manure pits, and modern creamery are part of the equipment, together with 1,000 sheep, 130 imported cows, and 50 work horses.

By this it may be seen that the agricultural schools of Australia and Egypt are not behind those of our own country in course of study, equipment and instructors.

State Horticultural Society will hold its thirty-second annual meeting in the state capitol, Topeka, Kas. The three days and evenings will be devoted in the usual way of similar meetings, to addresses on various topics with discussion of same, reports of committees, and social enjoyment. A number of promising subjects appear on the program, and the society extends a cordial invitation to all interested in horticulture and kindred lines to attend.

Holiday rates will be given by the railroads, and board at Topeka is very reasonable indeed, hotel rates ranging from \$1.00 to \$2.00 per day.

We hope, in a subsequent issue to present some of the many interesting papers read at this meeting.

AN INTERESTING TEST.

An Indiana farmer recently made an experiment which demonstrated beyond doubt what a harmful effect noise has upon cows as regards their milk yield. This farmer has a dairy of 20 cows and had always been very kind and gentle in his treatment of them. To prove his theory he bought a Babcock test for use in the dairy and one day he had the hired man drove the cows into a yard and turn the dogs in with them. Then the two men went in with sticks in their hands and began shouting; the dogs barked and there was a very noisy time for a few moments. The cows were not struck nor bitten, nor injured in any way, but upon driving them into the barn and milking them immediately afterwards, it was discovered that there was a decided falling off in the milk yield. The test showed that the falling off in butter fat was 10 per cent, which goes to show that in dealing with cows kindness, like honesty, "is the best policy."

The sentiment in favor of holding the Philippines would be less intense if somebody would explain how to let go.—*Detroit Tribune*.

PULSE OF THE IRRIGATION INDUSTRY.

THE ARKANSAS VALLEY.

James R. Davis, the industrial commissioner of the Santa Fe recently returned from a trip through the Arkansas Valley in Colorado, and is enthusiastic in his praise of that section of the West, which has been reclaimed and made habitable by means of irrigation. The Arkansas Valley is a section almost 100 miles long on either side of the Arkansas river, beginning at Canon City and ending at Holly, Col., within a few miles of the Kansas state line. There is scarcely a product of the soil that cannot be raised with success in this region. The Salvation Army colony is located in this section and, though the colony has only been established about six months, it has already taken off its first harvest, giving them almost a self-supporting yield. Their station is Holly. Says Mr. Davis in the *Chicago Record*: "The Arkansas valley enjoys the distinction of having one of the greatest and most complete irrigation enterprises in the United States. The five lakes cover an area of 14,000 acres, with a maximum depth of ninety feet. They are only used for storage purposes as auxiliaries to the canal system, which aggregates 410 miles of main canals supplied with water from the Arkansas river."

Irrigation has made the section what it now is, as it was once arid, and what has been done here may be done elsewhere by its aid. In concluding, the writer said "Arid land when provided with water is the most productive in the world. The fact of the matter is that the West is as inviting a field today as it ever was."

GILA BOTTOM DYKE.

The *Yuma* (Ariz.) *Sun* in a recent issue states that a plan is contemplated of dyking the bottom lands of the Gila river that lie just east of the Yuma levee. The sec-

tion of land in question lies in the shape of a horse-shoe and comprises an area of almost 600 acres of rich land, the richness being due to the sediment deposited by the Colorado river which annually overflows this tract. The proposition is to build a levee from the high bank, one mile above, in nearly a direct course along the Gila river to Prison hill, the purpose of which is to control the summer overflow from the Colorado. The word control is used because it is not intended to prevent the flooding of the bottoms entirely, as the water may be let in above by the head-gate and conducted over the highest portions of the land, and the entire tract given a thorough irrigation without leaving any surplus to stand in sloughs to drown out growing crops. A water gate at the lower end might serve to drain off the land should an over supply be let in at the head.

This levee need not be more than three or four feet in height on an average, and the cost, liberally estimated, need not be more than \$5000. Levees, under similar conditions, have been built at different places and proved to be successful and the *Sun* hopes that this proposition may be carried out.

The successful consummation of this undertaking, considering its close proximity to the town, and its surpassing fertility, could not fail to enhance the value of this tract many times its present value. For alfalfa alone, for which it would then be especially adapted, an expense of ten dollars per acre (an outside estimate on the cost per acre in constructing the levee), the outlay would prove as an investment a veritable bonanza.

Geo. H. Peck, an old resident of El Monte, Cal., recently contributed to the *Los Angeles Times* an interesting article

relative to the impounding of winter rains for the purpose of doing away with freshets and increasing irrigation.

"About twenty-five years ago," said he, "Col. Hamilton Hall, State Engineer, expended nearly a quarter of a million dollars in surveying the water sheds and canyons of the San Gabriel and other rivers, with the view of multiplying irrigation facilities and saving the lowlands from destruction by freshets. His plan was to impound the rains in the canyon. The project was never utilized, and the destruction of the lowlands and the attendant ruinous conditions to agricultural interests have continued and grown. In the meantime, the country has spent many thousands of dollars in remedial legislation, surveying river channels, building and caring for bridges, and so forth, nearly all of which has been a useless expense to taxpayers. The value of the land destroyed more than equaled the probable amount needed to impound the rains.

Meanwhile, other States and Territories have adopted Col. Hall's plan, with complete success. Quite a number of eminent engineers have commended, and so far as known, none have condemned it. It would seem that government construction, distribution and management is the only course by which to secure individual property and the rights of the public."

That the farmers of California are awakening to the truth of the above is shown by the fact that at the Farmers' Institute, held at Monrovia, last May, a resolution was passed declaring that the farmers assembled, realizing that several thousand acres of valuable land bordering the San Gabriel and other rivers have been and

will continue to be destroyed by freshets, "respectfully request the Legislature, and especially the senators and assemblymen of Los Angeles county, to consider the propriety of adopting such legislation as will secure to the farmers such a state or federal reservoir system as will immensely increase the irrigation supply, and at the same time save the lowlands from destruction."

This is certainly a step in the right direction.

The following is an extract from an address delivered at Covina, Cal., by Geo. H. Maxwell:

"In this necessity for cheap water lies the great merit of the policy of Federal storage reservoirs. Their purpose is to reinforce the natural flow of the streams, by so regulating them that the water will come down when needed, and this without charge of toll of any kind. If the reservoirs were to be built by private capital, the capital must be repaid, principal and interest, and though the burden goes first upon the California fruit-grower, it would have to be finally paid, if at all, in a higher price paid for the product by the eastern consumer. And it is very doubtful whether the industry would bear the burden. At any rate as conditions now exist, it would be practically impossible to put together a proposition which would warrant the investment of the capital. The possibility of a market for the products at a rate high enough to reimburse the capitalist, would after all be the capitalist's only security. It matters not what contract he might get from the land-owner. If the product could not be marketed with profit the land itself would afford no security."



WITH OUR EXCHANGES.

McCLURE'S.

In the December number Capt. Mahan begins a series of articles on the naval operations in the recent war; a new serial by Rudyard Kipling, entitled "Stalky & Co." is also begun. Stories from the experiences of a famous elephant hunter, from those of a telegraph operator and of a train-despatcher give the necessary spice of adventure to the number, while the holiday spirit is furnished by two Christmas stories.

REVIEW OF REVIEWS.

Mr. W. T. Stead, who has spent the greater part of the autumn in a tour of the European capitals, making inquiry into political and international conditions and especially with regard to the Czar's peace proposition, gives some of the results of his investigations in the December number, under the title "World Politics Through a Russian Atmosphere." Mr. Stead has a ready pen, and were he living in Germany would doubtless have to face the charge of "lese Majeste" for his words regarding the famous pilgrimage of Emperor William to the Holy Land, which he characterizes as "one of the most *bizarre* and picturesque incidents of the season." Says Mr. Stead "Belter men than he have made the pilgrimage before, although none ever signalized their Christian zeal by publicly fraternizing with the head of Mohammedanism, whose hands still drip with Christian gore." The reproductions of the paintings of J. J. Tissot in connection with the article on the great painter, are very fine. They are from scriptural subjects, most of them being scenes from the life of Christ. "Current History in Caricature," contains as usual the best of the caricatures that have appeared during the month, while the other departments are possibly more interesting than common, particularly the review of the late books, this being the season when so many new publications appear, and old friends,

in covers befitting the holiday time, greet us again.

THE COMPANION'S NEW CALENDAR.

The calendars given by *The Companion* in former years to all subscribers have been remarkable for their delicacy of design and richness of coloring. But the Calendar for 1899 far surpasses any of those. The publishers have endeavored to make it the finest calendar of the century, and readers of *The Companion* will not be disappointed in it. Those who subscribe now will receive not only the gift of the Calendar, but also all the issues of November and December, from the time of the subscription free. The new volume will be the best *The Companion* has ever published. Among the contributions already engaged are "The Little Demons of war," by Hon. John D. Long; "Opportunities for Young Explorers," Sir Clements Markham; "The Boy with a Voice," David Bispham; "The Wonders of Somnambulism," Dr. Wm. A. Hammond. "Police Spies in Russia," Poultney Bigelow; and "Where Living is Cheapest," Hon. Carroll D. Wright. Fine illustrated announcement and sample copies will be sent to any one addressing *The Youth's Companion*, 211 Columbus Ave., Boston, Mass.

The annual report of the Smithsonian Institute, (Washington, D. C.) a neatly bound volume of over 725 pages, has been received. The account of an archæologic expedition, sent out by the Bureau of American Ethnology of the Institute, to Winslow, Arizona, is especially interesting. The Pueblo ruins are in the vicinity of Winslow and the investigations were for the purpose of discovering something regarding the animals of the ancients. Many valuable pre-historic articles were found, fine plates being given in connection with the article.

The "Utilization of Niagara" and "Arctic explorations" are among the many subjects discussed.

AUSTRALIAN REVIEW OF REVIEWS.

The October number, the latest received, contains as a frontispiece the portrait of the Hon. Mrs. G. N. Curzon. Under the heading "Sharing the Empire with the States," attention is called to the fact that the vice-empress of India, second in rank in the British empire to Queen Victoria herself, is an American—a Chicago girl. That the "American wife" is becoming more and more in evidence in England, is showed by the number of prominent Englishmen who married American girls. The journal says, "Mr. Balfour is not married—probably because he has never been to America." The Earl of Kilmore, K. P., contributes an article on "The Proposed Harbor and Graving Dock at Large Bay," the proposed new port for Australia.

SCRIBNERS.

At the advent of each season—spring, summer, autumn and winter—Scribner appears with an appropriate art cover. The December number has a beautiful cover, with background of silver, suitable to Christmas time. The colored illustrations appearing in connection with the poem "The Rape of the Rhine—Gold" are an added attraction to the number. A portrait of John Ruskin published for the first time, is given in connection with "John Ruskin as an artist." Richard Harding Davis contributes "In the Rifle Pits," while among the short stories are "Where's Nora?" by Sara Orne Jewett, and "Mrs. H. Harrison Wells's Shoes," by Jesse Lynch Williams.

THE FORUM.

Agriculture and forestry being so closely allied with irrigation interests, the article in the December number on "Forest Fires" was the first one to command our attention. "A fire in the forests, especially at night is one of the grandest and most awe-inspiring spectacles in nature," says the writer, Henry Gannett, "It is a magnificent spectacle, but one too expensive to be indulged in even by Americans." This being true it is well to consider every possible means by which they may be prevented. Some idea of the extent and damage of forest fires is afforded by the statement that in 1880,

according to information collected by Prof. C. S. Sargent, in connection with the Tenth Census of the United States, at least ten and a quarter million acres of forest land was destroyed by fire during that year, the value being more than \$25,000,000. The year was not one especially remarkable for fires either. Forest fires during the present year have been more frequent than for some time previous, owing probably to the dryness of the past summer, the western states of Colorado, Wyoming, Montana, Washington, etc., suffering most. Washington and Oregon have always been the scenes of great and destructive fires. Despite the great losses yearly resulting from this cause, it was not until recent years that any concerted attempt was made to check them, New York being the first state to take the matter up in earnest. In 1885 her legislature passed a law providing that setting fires, whether accidentally or intentionally, should be punishable by fines or imprisonment and an organization of fire wardens was made. This method proved so efficacious that we hear little of fires in that state. The eastern states soon followed her example but the west was slower to accept the lesson. One of the methods suggested by Mr. Gannett for preventing the spread of forest fires is the clearing of broad roads through the dense forests at frequent intervals, not only for quick and easy communication, but to serve as fire-lanes, up to which fires may spread, but beyond which they may be prevented from passing."

The *California Mirror*, a weekly journal published at Los Angeles, Cal., is noted for the caricatures appearing on the front page of each issue. That of Nov. 26 shows the "G. O. P." elephant sitting down to his Thanksgiving dinner of "prosperity pudding," "political pie" and "Victory brand" champagne, while the defeated democratic tiger, with one eye patched up, runs from the missiles of "dead issues" that are being thrown. Its agricultural department contains an address on Storage Reservoirs, delivered by Geo. H. Maxwell before the Pomological Society of Southern California at Covina, Nov. 17. "Forest Preservation" is also discussed.



RIO GRANDE HAYING.

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THE IRRIGATION AGE.

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THE PROGRESS OF WESTERN AMERICA.

A New Year's Greeting.

The past year of 1898 may certainly be called a "history-making year" so many stirring events have taken place, so many changes made, that to even mention, let alone discuss, them, would demand more time and space than we can spare. With the history of the late war—begun in the interest of humanity but ending in the acquisition of new territory that was as unexpected as it is, to many, unwelcome,—we are all familiar, and to review the glorious events which changed civilians to soldiers, soldiers to heroes, cemented north and south in bonds of friendship, and rescued oppressed Cuba from the tyranny of Spain, would be but a repetition of what has already been repeated. So with a welcoming shout for the soldiers returning and a tear for those who will return no more, we leave this part of history. After the usual Spanish delay, the terms of peace have been signed and the war is over. As a result of the conflict, in which Uncle Sam has demonstrated that he "intends to have peace if he has to fight for it," the United States has won for herself wholesome respect from foreign powers, and begins the New Year with a large standing army, better defenses, a stronger navy and a friendlier relation with England, than ever before. and a colonial territory heretofore undreamed of. Good crops and increased trade has made the past year one of prosperity. The interest manifested in the irrigation movement is a cause of especial rejoicing to all of us who are working for the cause; and we see encouraging signs

for still more progress in the year of 1899.

So with rejoicing for our achievements, regrets for our failures: with the determination to turn over the traditional "new leaf" and, if necessary, nail it down to keep it turned; the AGE welcomes 1899 and wishes for its readers a happy and prosperous New Year.

Possibilities of Northern Wyoming. Wyoming is a state of big possibilities. Long regarded as only a range country, its broad plains and valleys were covered by roaming flocks and herds while other regions no more favorably situated were being dotted over with homesteads. But a change has come, and when the next great westward movement of homeseekers occurs Wyoming will attract thousands where before she attracted scores. One of the last of the arid states to recognize the benefits of irrigation, Wyoming is now one of its most active and certainly its most intelligent advocate. In no other state have so many public men of genuine ability and almost prophetic foresight given their best efforts to the study of the problems of irrigation in its relations to the development of a region capable of almost unlimited advancement when its water supply is utilized to the utmost. Ex-Senator J. M. Carey devoted his great abilities to the study of irrigation and to framing and securing the passage of the Carey Act, which, whatever its defects, has had great influence in developing portions of the arid region and in directing public attention to the needs and possibilities of the states where irrigation is nec-

essary to agricultural development. Though out of the Senate, Judge Carey is still a power; and as President of the National Irrigation Congress he will have large opportunity to use his power for the advancement of the irrigation interests of the Great West. Senator Warren, also of Wyoming, is likewise a student and an advocate of irrigation: and his work in the Senate is likely to have even greater practical results than that of his predecessor for the reason that he has the advantage of accumulated knowledge and experience. Wyoming's system of water rights and water administration is the best in the west—due mainly to the engineering skill and administrative ability of her territorial and state engineer, Elwood Mead, and to the long lease of official life she has given him. For the reasons here stated or suggested, it seems that a discussion of the resources of Wyoming is bound to be of more than local interest, especially when it is carried on by men of such standing as to make their statements authoritative in the best sense. The writers of this series of articles, who were members of the party which examined the valleys of Wyoming in 1897, are men of large practical experience and unusual technical ability. Professor Mead and Colonel Nettleton are too widely known among those familiar with the irrigation history of the West to need introduction to our readers. Captain Chittendon was the former engineer officer of Yellowstone Park, and is one of the most distinguished engineer officers of the U. S. Army. Clarence T. Johnston, as assistant state engineer of Wyoming, has been principally employed in making stream measurements for that office and for the U. S. Geological Survey. We confess to feeling a good deal of pride in being able to present so valuable a series of articles to our readers.—THE EDITOR.

Reports to the Secretary of Agriculture. In his report to the Secretary of Agriculture for the year ending June 30, 1898, Mr. John Hyde, the statistician, recommends that there be appointed five traveling inspectors, whose duty it shall be to visit periodically the state and county agents, to visit the principal agricultural regions after seed time and during critical periods of the growing season, and report to the

statistician the results of their observations. In this way more accurate and reliable reports may be obtained than by the present system of reports from state agents, supplemented by voluntary reports. Mr. Hyde further calls attention to the necessity of making adequate provision for establishing a system of crop investigation and reporting for the islands recently acquired by the United States.

Methods of investigating soil conditions have been considerably improved during the past year by the department having charge of the work, and among the interesting investigations carried on was that regarding the alkali soils of the Yellowstone Valley. It was found that in the original prairie soil above the ditch there is not sufficient alkali to be injurious to vegetation. The amount of alkali was greater in the lower depths of the subsoil. As a rule, water is used in excess on all of these lands under irrigation, and in all cases the first injury was from the accumulation of water from excessive application.

The Bureau of Animal Industry has made experiments upon hog cholera and swine plague with such gratifying results that the experiments will be continued. Dipping cattle to destroy the ticks, which spread the infection of Texas fever, has met with such success that preparations are made to adopt it generally, as a solution has been discovered into which the cattle may be dipped without injurious effects. Cattle may then be shipped north of the quarantine line. The dipping of sheep to prevent sheep scab was also advised. It was recommended that during the coming year the government inspection and certification of meat and meat products for export from this country be extended to include butter, cheese and condensed milk.

Dr. A. C. True, Director of the Office of Experiment Stations, in his yearly report, gives encouraging news from his department. The agricultural experiment stations are, as a rule, doing more thorough and effective work than ever before and while the number and importance of institutions organized for scientific researches on behalf of agriculture are constantly increasing in all parts of the world, nowhere has so comprehensive and efficient a sys-

tem of experiment stations been established as in the United States. The investigations of the agricultural resources of Alaska were continued during the year. Prof. C. C. Georgeson, a native of Denmark, who has had a long experience as professor of agriculture and as an experiment station officer in Japan and Kansas, was made special agent in charge of these investigations. His headquarters are at Sitka, and experimental plantings of seed of over 100 varieties of vegetables, grasses, and forage plants have been made in the vicinity. Investigations upon the "Nutritious value of various articles and commodities used for human food" have been pursued and the result of the studies have been re-published not only in this country but abroad. The most radical and important step taken by the department has been the collection of data on the subject of irrigation, which will be published in bulletin form during the present fiscal year.

The report of the United States Geological Survey is now in preparation and will be more comprehensive, as far as the subject of irrigation is concerned, than previous ones. The topics presented will be:—Quantity of steam flow, this to include measurements of various streams with a view to utilization either for municipal or irrigation purposes, the quality of water: lakes and ponds, their origin, size, location, etc.; irrigation canals and ditches, under which will be noted the recent progress in the development of irrigation, especially of large structures, and while a complete list of irrigation enterprises cannot be given, mention will be made of the more important ones, whose construction bears upon the utilization of the vacant public lands: pollution of streams: water power: storing water, which will include a description of reservoirs surveyed and projects recently constructed or under consideration, the methods of constructing dams, and other information bearing upon this very important subject of the storage of floods and waste water for the development of the water resources: pumping water is another thing considered, and is taken up more especially with reference to the utilization of the water supply for irrigation purposes as well as for draining swamp lands.

The Fifty-fifth Congress.

Among the subjects that were under discussion before the recess of Congress was the Nicaragua canal bill, which has so long been a question before the public and which has been the source of much controversy. What government is to be adopted in the Philippines, whether they are to have home government or a colonial one, was argued pro and con. A bill to increase the standing army was introduced, as was also the Pension Appropriation bill. The proposed amendment to this latter bill met with determined opposition. This amendment provided that ex-Confederate soldiers or their widows and children should be pensioned. The breach between north and south is now so nearly healed that only a few prejudiced northerners would object to old Confederate soldiers becoming inmates of the soldiers' home: but granting them a pension for fighting against this government—ah, that is a different matter, and savors of sentimentality.

Ethan Hitchcock, of Missouri, has been appointed by President McKinley to succeed Senator Bliss as Secretary of the Interior.

Will it Injure the Farmers?

There has sprung up considerable agitation concerning annexation, imperialism, militarism, etc., among the agricultural publications of the country, and our opinion regarding them has been asked. We have not given the matter the study and careful consideration the subject should receive before an opinion upon it is formed, and it is therefore with hesitancy we speak, and if we are mistaken in our views, we are always open to conviction. Laying aside all prejudice and party feeling and speaking with frankness and sincerity, we cannot see how the acquisition of new territory by this country can result disastrously to the American farmer, nor how it is, as many claim, a departure from the previous policy of the nation. The United States extended her territory when she purchased Louisiana from France, Florida from Spain, a portion of Texas from Mexico, and Alaska from Russia, and her present acquirement of new territory differs only in the manner of its acquirement—the latter being, in a measure, thrust up-

on us. In freeing Cuba many new problems confront us, problems that were unforeseen before the war began. As to our letting go of the Philippines, we are in much the same position as is the man who grasps the handles of an electric battery and has too strong a current applied. It may not be what he likes but he cannot let go until some one turns off the current. No European power has, as yet, turned off the current and we must, perforce, hold on. The productions of the Philippines, Hawaii and Cuba are so widely divergent in character from those of this country that, with the exception of sugar, they will not compete with those of the United States, while whatever loss the beet sugar industry may suffer will be more than repaid by the opportunity given farmers to dispose of their wheat, grain and other products to these new markets.

A Brief Call. On January 3rd we had the pleasure of meeting Mr. L. C. Carpenter, C. and I. E., who called at the AGE office. Mr. Collins is connected with the State Agricultural College of Fort Collins, Col. We regret the briefness of Mr. Carpenter's stay, but hope to have an opportunity, in the future, to become better acquainted.

Things Talked About. The public seems to be considerably agitated over the Utah congressman, Roberts, and his three wives, and there is much opposition manifested to his taking his seat. It is rather a hard question to decide, but as he has had three wives for several years; had them when elected, we lean somewhat to the opinion as expressed by an exchange that so long as Mr. Roberts was elected fairly by the people of his state, the fact of his having three wives is no more to his discredit than the proven charges of bribery are against many of the members. If a man is the chosen representative of the people and his actions are not so criminal as to land him in jail, it is hard to see by what law he can be prevented from taking his seat. If only those whose private lives would bear close inspection were sent to Congress, there would be many a seat vacant, and while this is a sad truth, it is truth, nevertheless, and if Mr. Roberts married these women it seems

more to his credit to support and acknowledge them, than it would to curry favor by deserting one or two of them. At least the matter will give a subject for the newspaper wits to exercise themselves on. A man at Kansas City, Mo., has just been released from the workhouse there on condition that he get out of the state, who is ahead of Roberts, having eight wives. No wonder he was in the work house!

After the United States whipped Spain, there seemed to be strong indications that Cuba herself would require a little "dressing down." Havana was in a state of dangerous excitement, bordering on riot, the dissatisfaction being caused, it was claimed, by the refusal of Gen'l Brooke to permit Cuban troops from joining in the exercises held Sunday, Jan. 1, in honor of the evacuation of Havana. The affair passed off without any disturbance, however, and Cuba is now free, and the stars and stripes float over Havana.

Rumor has it that Canada fears the territorial expansion fever has such a hold on Uncle Sam that he will annex her next. Toronto papers have much to say concerning this.

The hired girls have at last decided to form a union, and its rules will go into effect as soon as the two women organizers arrive from Copenhagen. Among these rules are, that work is to begin at 6:30 a. m. and end at 9:30 p. m.; one night a week and every other Sunday off; light, warm and well ventilated rooms, with only one hired girl to a bed.

Chicago is making a desperate and praiseworthy "kick" against the infamous Allen law and it is to be hoped the great weight of public opinion, added to the Mayor's veto, will foil Mr. Yerkes' scheme to get a great deal of something for nothing.

THE IRRIGATION PROBLEMS AND POSSIBILITIES OF NORTHERN WYOMING.

SOME OF THE AGRICULTURAL PROBLEMS AND POSSIBILITIES OF NORTHERN WYOMING— IMPRESSIONS OF A CAMPING TRIP.

BY PROF. ELWOOD MEAD.

Early in 1897, I decided that before snow fell again I would visit Wind river and Jackson hole, the two irrigable districts of the state I had not seen. To do this was no holiday affair. Both are far from railroads—one might truthfully say from good roads of any kind. To make even a hasty examination of their agricultural prospects required so large an outlay of both money and time that I had not before been able to attempt it, though it had long been in mind. When, therefore, a proposal to unite our forces came from Captain H. M. Chittenden of the Corps of Engineers, U. S. A., the offer was gladly accepted. Captain Chittenden wished to examine some reservoir sites in the Big Horn mountains and we arranged our trip to begin with his work and end with mine. To do this we had to start at Buffalo, Wyoming, climb the Big Horn range to the headwaters of Piney Creek at the base of Cloud Peak and from there to return to Sheridan to outfit for the longer journey. As the latter involved a ride on horseback and in wagons of over 600 miles, in which three lofty and rugged mountain ranges had to be climbed, and two of the largest rivers in the state forded, we had to have a good outfit. The need of this was not lessened by the fact that much of the distance would be through a region devoid of either settlers or houses, making the carrying and cooking of our meals, and providing our own shelter not a matter of choice, but of necessity.

Before we set out so much interest was manifested in the sections we were to visit that our party of two had grown to seven. Clarence T. Johnston, Assistant State Engineer, was added to gage the streams crossed for the U. S. Geological Survey. Hon. Henry G. Hay, State Treasurer and the first government land surveyor in Wyoming Territory, joined us and he was followed by Hon. E. S. Nettleton, ex-State Engineer of Colorado, C. H. Harrison, a hydraulic engineer of St. Paul, and Rev. E. E. Smiley of Cheyenne. While six of the seven

were educated civil engineers their present callings ranged from theology to politics and war so that we felt equipped for any emergency which might arise.

Our examination of Piney Creek was greatly aided by the courtesy of the Rock Creek and Piney Reservoir and Ditch Company and their engineer, Mr. Bond. This company is an association of farmers on Rock Creek who have not water enough to irrigate the land they have under ditches and who have banded themselves together in an effort to in some way increase the supply. Being familiar with the region in which the reservoir sites were located they kindly offered to guide us and furnished the tents, pack horses, saddle animals and provisions for the trip. As this involved a climb from one mile above sea level at Buffalo to over two and one-half miles above that level at the highest point we reached the assistance which they rendered was highly appreciated and contributed much to the comfort and success of our examination.

Piney Creek is one of the most important streams rising in the Big Horn range and, owing to peculiar physical conditions, the use of its waters in irrigation have created about as many water right problems as there are ditches. Rising in the immense snow banks, which lie at the base of the precipitous cliffs on the north and east side of Cloud Peak, its headwaters drain the summit of the main range for a long distance and this gives to its discharge a perennial character not shared by the smaller streams on either side of it and which its drainage cuts off from the late water supply. It not only rises above these smaller streams but it stays above them after it leaves the mountains from which it emerges on a ridge instead of in a valley. This ridge is a conspicuous feature of the topography of that region. Its summit is the boundary between Johnson and Sheridan counties and the divide which separates the drainage of Tongue and Powder rivers. Piney Creek is the largest tributary of the latter stream, yet one mile from the point where it enters the valley it is less than fifty feet below the top of this divide. Hence, water can be taken from its channel and turned into other streams in both drainage basins and has been taken and is used to reinforce the supply of eight of these valleys. These smaller streams have not a perennial flow. They have a flood in the spring and run dry, or almost dry, before the irrigation season is over. In order to mature their crops the owners of ditches out of them have to obtain a supplemental supply from some other source and they have secured this by building ditches to divert the waters of Piney Creek into them. This stream has therefore to supply irrigators in its own valley for the entire season and water for all the late irrigation on these other streams. The late supply is not sufficient to do this, so that instead of a shortage on part of the streams there is now a shortage in the last part of the season on all

DRAINAGE MAP
 OF
 WYOMING



of them and the acreage of crops which can be brought to maturity is not measured by the flood discharge on any stream but by the July flow of Piney Creek alone. Taking the combined flow of all these streams it is probable that four or five times as much water runs to waste in June as is beneficially used. The June discharge on Piney Creek alone is about three times that of the July flow, while the demand in June is not one-third that of the latter month. The benefits to be derived from the storage of the early flood waters are therefore so apparent that the construction of reservoirs is an essential requisite to the further extension of the cultivated area in this section and this fact is now generally recognized.

Our trip was to determine to what extent the topography of this country would permit the desire for storage being realized. Preliminary surveys filed in the State Engineer's office had led to the belief that the conditions were very favorable and the more careful surveys instituted by Captain Chittenden fully confirmed this impression.

The largest of these basins is Lake De Smet, which lies just outside the mountains. It is over three miles long and one mile wide. It is at present partly filled with water but has no outlet. Its utilization, therefore, will require the construction of a canal to fill it and of an outlet tunnel to empty it after it is filled. The making of these two improvements will permit of the impounding of 67,000 acre feet, or about three times as much water as is now used in the growing of cultivated crops in the entire district.

The other lakes lie far back in the mountains at elevations ranging from 9,000 to 11,000 feet above sea level. The highest lie almost at timber line. The others in the canon of this stream are basins of solid granite and bordered by dense and extensive forests of pine and spruce. The ones surveyed are the largest and lowest of the series, but in addition to those there are at least a score of others of smaller size which could be improved if the larger ones do not afford capacity to store all the waste water. These lakes lie in the channel of the main stream and are connected by a series of water-falls and cascades which form a landscape of such beauty as to be worthy of a visit even if the lakes would serve no other purpose. The four surveyed can, however, be made to store about 30,000 acre feet of water, making a total combined storage in the five reservoirs of over 90,000 acre feet.

The influence of this improvement on the productiveness and value of the lands in the valley below can scarcely be realized. While ditches have been built to water about 40,000 acres of land the natural flow of these streams only permits of the cultivation of about 10,000 acres. The storage of this water would reclaim from aridity and add to the productive lands of this section more than four times that now in use. The following table gives the capacity and estimated cost of these works:

SUMMARY, CAPACITIES AND COST.

Name of Reservoir	Capacity in Acre foot	Estimated cost	Cost per Acre ft.
Elk Lake.	2,500	8,000	3.20
Kearney Lake.	3,800	7,600	2.00
Cloud Peak Lake,	6,800	31,040.75	4.56
Piney Reservoir,	11,040	70,226.25	6.37
Lake De Smet,	67,000	113,360.90	1.67
Total.....	91,140	230,207.00	17.80

According to these estimates the average cost of preparing to store an acre foot of water will approximate two dollars and fifty cents. Every acre foot stored of that which now runs to waste will add an acre to the area of land which can be cultivated and change its selling and productive value from grazing to farming land. The significant feature about this is that two dollars and fifty cents covers the entire outlay required. The ditches now built will serve to distribute the increased supply and the expense of looking after the reservoirs will in part be met by the lessened outlay now required to pay the water commissioner for his services in closing headgates in time of scarcity.

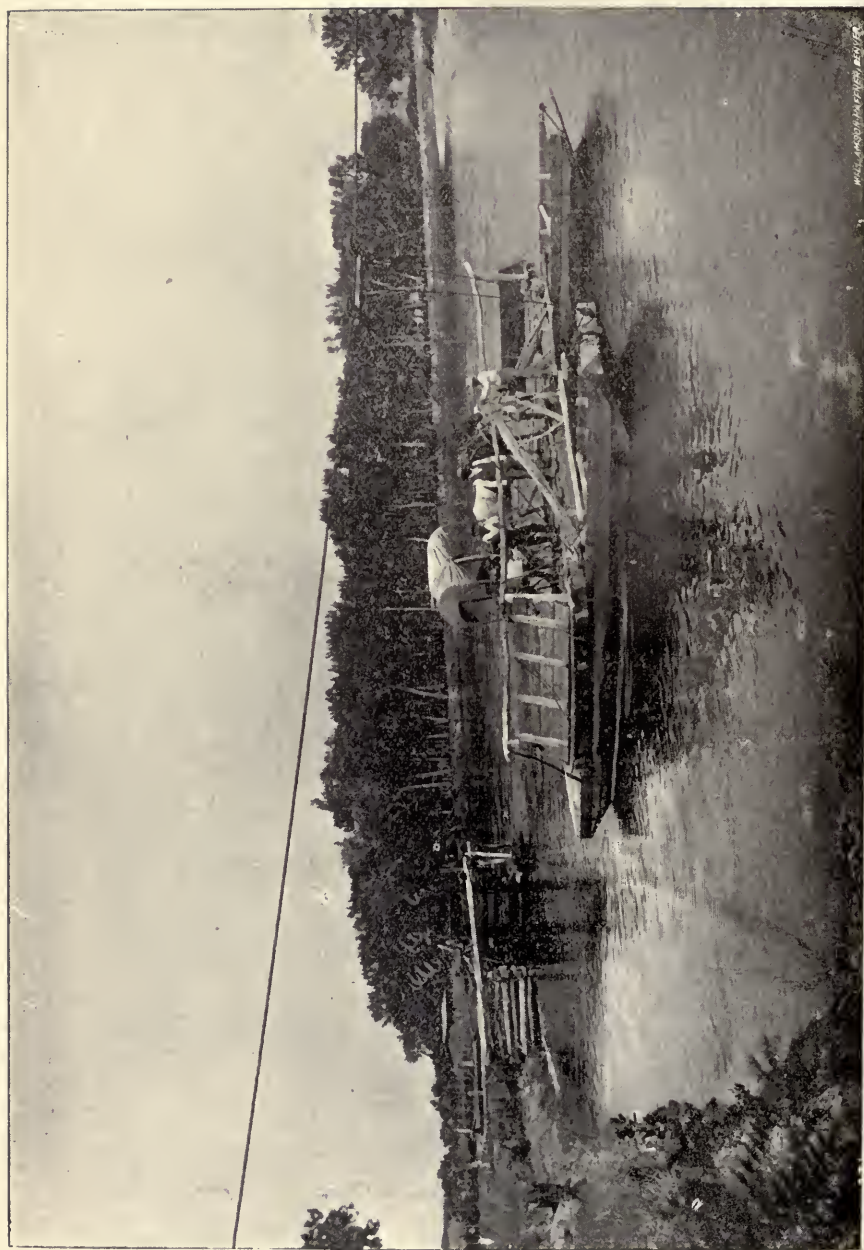
PUBLIC VS. PRIVATE OWNERSHIP.

With such returns in sight why have not these works been built? The reasons are apparent and conclusive.

In the first place, those who need them most have not the money to build them. They are the holders of late priorities, the cultivators of the farms first cut off from the stream when it runs low. Because of this, their lands have the least value and they are least able to incur the outlay.

All these basins except Lake De Smet discharge into the main stream and every appropriator below would have a chance to absorb a part of the stored supply. Parties undertaking to build these reservoirs as an investment would not, therefore, be able to reap any return from their outlay unless some plan can be devised for the public control of the water after it is turned into the stream and its distribution among those entitled to it and those only. All efforts so far to enlist irrigators in the valley in this work as a community enterprise have failed. Many are so situated that they believe if the reservoirs are built and the water turned into the stream they can steal enough to irrigate their lands and, hence, do not propose to contribute anything, and the experience of those who have built ditches to turn the water of Piney Creek into the smaller streams shows that it is impossible without a material increase in the supervision exercised by the state to prevent this being done. A study of the irrigation map of this region shows how the priorities are intermingled and how the ditches built ramify not only in one drainage basin but in half a dozen.

If this water is stored by private investors and disposed of to only



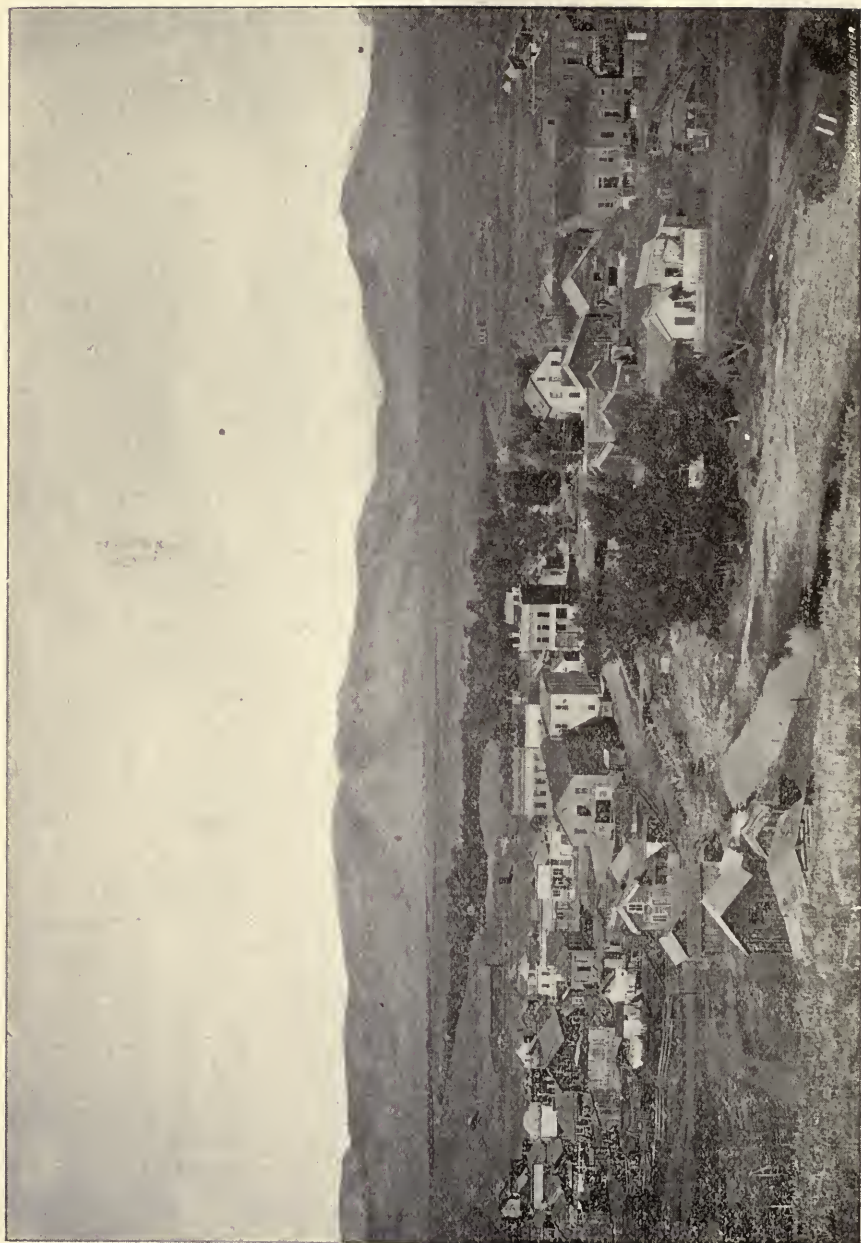
BIG HORN FERRY, WYO.

those who will pay for it it will necessitate a distinction between priorities, between the use of the natural and the stored supply that will lead to unending complications. The truth is that the building of important reservoir systems like this are as much public improvement as the building of roads or the paving of city streets. Even if the reservoirs are built as private enterprises their owners will have to rely upon the state for protection in the distribution, and in this also there will be so many ditches to secure a partial supply for a brief season and so many farms to be watered in part from the natural flow and in part from the stored flow that a separation of public and private rights seems to be almost impossible. An attempt to frame laws to make the improvement of these natural sites an attractive field for private investment will only increase the complications. No law will be effective without it confers absolute property rights in the stored water and to do this will be to create monopolies which may be a means of oppressing the farmers instead of helping them. Some reservoirs can be profitably built as private enterprises, but it is my conviction that important systems like the one under consideration ought to be built and operated as public works.

THE BIG HORN BASIN.

The second night out from Sheridan we camped almost at the summit of the Big Horn range on the dividing ridge between Tongue river and Shell creek. From the summit of this mountain it is possible to see the snow clad summits of the Shoshone range on the opposite side of the Big Horn Basin, and the winding course of the Big Horn river can be traced by the fringe of cottonwood trees which borders it as can that of its two principal tributaries, the Grey Bull and Shoshone rivers on the west. The term "basin" used in describing this valley is correctly used because it is an immense bowl entirely surrounded by lofty mountains, but any one who expects to find it presenting the appearance of a valley, as that term is ordinarily used, will be disappointed. The greater part of its surface is of the hilly and broken character. Some of the bad land ridges rise almost to the dignity of mountains and are fully as impassable. The limits of irrigation are restricted to those level stretches which border immediately on the stream. Outside of this the country is too broken to build ditches and the greater part of the land is unfit for cultivation if water could be carried to it.

(To be Continued.)



BUFFALO, WYO.

UNPROFITABLE IRRIGATION WORKS.

No. VIII.

T. S. VAN DYKE.

Can irrigation works be built at a profit today?

In spite of all the failures and the tendency of so many to the cities I still believe that irrigation works can be made to pay a certain and sufficient profit on their reasonable cost.

But it is quite as certain that this cannot be done in many of the ways that have paid in the past. The day when the plethoric eastern purse was looking for stock in water companies is among the milestones of the past, and so is the day when settlers could be inveigled with sonorous names and handsome pictures in a prospectus. The photograph is of little more use today than the alleged word-painting of the years gone by, the charming townsite lures scarce a lingering glance, and the new hotel has as little effect on the desired "sucker" as the dividend paid out of the sales of stock now has on the investor. Investors have lately developed a singular curiosity about what they are to get for their money; while even the man who is willing to live in the county in place of starving in the city, wants to know whether he is to wrestle alone with the desert for years or whether he is to have company in the operation. Neither do men want to be told what fine sugar beets the land will raise if there is no factory to sell them to, and little they care about canaigre or ramie unless there is some way to handle the product for them.

Many of the old time methods must be changed. Many good settlements have been made by plenty of good land and sure water at a reasonable price and these will succeed even under the adverse conditions of today provided certain conditions are complied with. To try to cover them all would be silly but there are a few of such general application that they are worth considering.

First—the land must be on or very near a railroad. The day is past when people will go very far from one as the first settlers did in many of the best settlements of California, Arizona and other parts of the arid west. It is useless to argue. There is nothing to do but comply. If your project is very far on one side let it alone until there is a more crying demand to get out of the city and into the country. And even then be careful how you spend too much money and set your prices high in hope of getting it back.

It by no means follows from this that it will pay to build a railroad. And a hotel built in such a way as to require a large force of servants when there is no one there is also a nice thing to handicap a proposition. Of all things to sicken a colonist few equal a country hotel aping city style and making a wretched botch of it, especially when one is charged city prices. There is a general air of financial inanition about such a concern that quickly alarms one of any sense. And by the way you might remember that a large business office with fancy furniture and swell clerks hanging around big safes and rustling ponderous maps has seen its best days. The trick of a beggar wearing good clothes, displaying a "wad" of goodly proportions and giving champagne suppers is also understood quite well in these later days of the century.

Our lines have fallen for the present in a very practical age where unreasonable busybodies are talking about "brass tacks" and such nonsense unheard of in the days when we got rich over night on the money of the verdant and hasty.

These people are very annoying to one who has the Universe by the hair, but as they happen to have the money just now we may have to listen to them until the day of the enthusiastic and reckless returns. When Kansas farmers can again borrow fifty dollars or so an acre on their farms to go west with for town lots we may again do some of the old time business. In the meantime let us remember that though there are still in the sea as good fish as ever were caught they do not bite as they used to.

The proposition then must be strict business from start to finish, founded on facts and not on fancy, with all matters of cost figured high and everything in the way of income reckoned low. The contingency list must be made as large as possible, instead of small, and it must be ever borne in mind that every contingency is sure to contingence. There are enterprises where all this can be done and a fair profit still be made. But one may as well lay aside all ideas of doubling money or getting control of something that can be manipulated by construction companies or other wheels within wheels so as to roll up a fortune for the inside few without any one knowing of it or without injuring the enterprise. Unless you can get an honest enterprise that will pay when run in an honest way you might as well let it alone, for capital is very weary of anything else and is not blind as it once was. Nor are settlers struggling as they once were for land under ditches that are to go bankrupt. They too have an idea that the success of the company has something to do with their land values and also with the delivery of water in case of a pinch.

Abandon all ideas of making dividends out of annual rentals or tolls for the use of water. A company cannot be safely operated on any such basis and the annual payments should be just high enough to

ensure good maintenance and operation of the works. Why cannot dividends be paid out of the rentals? Because they can't and that is enough. Human nature does not permit it and that settles it.

This means that it might as well be a landowners company? Exactly. The sooner we recognize the weakness of the irrigation company that attempts to run like a city water company the sooner we shall get somewhere. There might be cases where it is possible to make one succeed, but you had better not try it. Make the money on the sale of land supplied with water, or the sale of water rights, or both, and figure on turning over the stock to the land owners and letting them set the rates to suit themselves. This does not at all interfere with keeping control of the stock for the management of the company until ready to turn it over. This can be done by escrow, or in other ways. You want no landowners bothering you until you are ready to surrender the stock or nearly so.

Is there anything more absurd than to scour the earth for money to get more water to put into the upper end of a ditch to allow a lot of ignoramuses to waste at the lower end? Begin your engineering at the lower end as well as at the upper. Securing water rights above for the future is all right, but instead of pouring down a large stream to be wasted make them economize from the start. The kindness of companies in putting no restrictions on the use of water before increasing settlement called for them has been an injury in almost every case. Thousands of acres have thus been alkaliied and damaged in various ways, while many a good proposition has been hoodooed out of several years growth by the miserable display of alternate swamp and brickyard made by the man who was allowed to begin irrigating in a desert with no one to show him any of the mysteries of what is really one of the fine arts.

Not a man should be allowed to touch desert soil with water unless he does it right. That he will do it wrongly is as certain as the rising of the sun unless he has some good models to follow. The grading, laying out of the land and management of the water on the land and the crops, generally deemed of the last importance, are really of the first. A premium of twenty to forty acres with full paid up water right, water rentals is and all for a period of years should be given each year to the man who makes the best showing under intelligent supervision. If the proposition is what it purports to be the promoters can well afford to take a hand in their own game and cultivate in the best manner a piece of land themselves. If the land will produce anything that is worth selling they can also afford to take part or all of the first year's payment in produce grown on the land and delivered at the railroad station. In some way something should now be done to show the confidence of the company in its own enterprise. And there is no better way to do this than for some of the members to begin with the first

water to get the best results out of the soil. You may find some land owners, if there are any on the ground, afraid of the price you ask for a water right even if it is very low. Meet this at the outset with this proposition:

“Perhaps, my dear sir, you think this is paying too much for the whistle. Perhaps it is. You may be the judge of that. Right in this contract we will insert a clause that at any time after one, two or three years, (suit yourself about the time) when you think you have paid too dear for the whistle just give it back to us and we will release the lien by which you have secured it on the land.” No proposition is more safe. If the land is as good and the water as sure as you have probably represented you could not get the water away from a man who has used it three years for double what he paid for it.

What is more stupid than to allow several dozen families to scatter over as many square miles, each with a separate lateral to be cleaned and bothered with, each one trying to work out its own salvation in its own ignorant way with no one to show how to irrigate, each one distant from school-house, store and other things that tend to break the loneliness of a new settlement of the desert? If the land is good and in sufficient quantity for a decent settlement one can find plenty in a body where they can help each other at the start and keep each other company. Hold the whole on one lateral, pushing out only as increasing settlement calls for it.

Remember that every tenderfoot that you “steer” to the land will in some way get hold of the settlers already there, no matter how carefully you may round him up. You should therefore make every one of them a walking advertisement by making him contented. This is not so hard as it might seem and is often more a matter of good intention than of actual performance. But nothing is more insane than to expect a success in selling land with a lot of growlers on the ground. When such is the case there is generally some reason for the growling and it does not take the new comer long to discover that something is the matter. When you are least expecting it he escapes from under your wing, rounds up a settler under some shed, and in two minutes your customer is lost.

I never want to build any more water works without the whole of the construction money in sight before much work is begun. This is very hard to have and some very good works could not possibly be built in that way. Few irrigation works have ever been built in that way. Nevertheless it is a good rule to follow in the future. It is very interesting to start the snowball down hill and see it gather more and grow in its course provided always that it will do it. But as a rule it will do nothing of the sort. It is more often a new struggle for life at every attempt to raise money, a constant skirmish in which victory is but little better than defeat. As sure as money is

thus scratched together piecemeal the work will cost far more, with a good chance of losing your hold upon it at any stage of the game. The hardest thing in all building of irrigation works is not the engineering, which is generally very simple, but to find the ultimate tenderfoot who is to do the bleeding. Nearly every one in the long line of those that "can raise the money" is but a promoter posing as a capitalist putting up his own money; whereas he is in fact trying to "pull the leg" of some confiding friend in the rear and turn a commission on the operation. And the richer your capitalist the more he likes to do this very trick.

Then once an enterprise gets "in the hole" no one now days is going to try to pull it out until fully assured of the depth of the hole. The fragments of the broken crockery will then be gathered in at the lowest possible price and capital is generally in so little haste about this that it leaves a very small platform for impecunious promoters and small fry investors to get off on. Paying for the work with stock, water-rights, bonds, or other assets except cash, is a very troublesome and dangerous way of getting out of such an abyss. Men doing high class work like the engineers and attorneys will do good service for such pay, but all the common grades of labor will do very poor work and you are not in condition to object very strongly. Moreover the stock and bonds want to be held well together and the bonds must generally be in one block to sell well, and often to sell at all; for nothing spoils the price like having some thrown back on the market at a lower figure, or being held at an extravagant figure when it is necessary to have them all to make some deal.

This subject would make a book and I must cut it short with only a few hints. The engineering and legal work in any irrigation enterprise is play beside the business part of it. It is the failure there that has made so much loss. There is positively nothing the matter with the land and water part of it in nine cases out of ten. If handled in a business way and the first water available used for actual production in the best manner by the company itself, the proposition ought to carry itself until settlers enough can be secured to make a profit well worth working for. If land enough of the right kind and in a good locality has been secured at the outset at a *dry* figure, and the water is not too expensive, there should be little trouble in paying some interest on the cost the second year from annual crops, provided the projectors have put in enough of their own money and have not borrowed too much at too high interest. There are few enterprises of any kind that will now justify the old time "hurrah-boys,-here-we-go" style, and the fact that irrigation works can no longer be built in that way is nothing against them.

The system of a central village of acre lots with the cultivated tracts outside, which was started in Payette, Idaho, I believe, by

Wm. E. Smythe, the founder and former editor of THE AGE, seems the best of all to meet the wants of modern times where people dread isolation. It certainly has great advantages and no objections that I can see because no one is obliged to live in the center. But there are some things that settlers should be compelled to do, such as arrange waste water ditches and plant timber along them so as to be at no expense for fuel, save the manure, use gates in the laterals instead of dirt dams, etc., etc., etc.

Another plan, proposed by Mr. Smythe, is of vast utility if the details are worked out right. In fact it is almost indispensable. Numbers of bankrupt works are now *in extremis*, with no money, no experts, no officers who know anything; in the hands generally of mere real estate men, or receivers who know still less. All are fighting one another and none have any prospect of climbing out of the hole for many a year to come. Few settlers will touch any land under them because no one of sense wants land under a ditch that is in much financial trouble and most people want to buy where it will be easy to sell again if necessary. If these could all be joined in one company, so that land sold under any of them would enure to the benefit of all, none would be under any temptation to pull another down, but all would be working for each one. Then one set of experts could do the work for the whole and they could be men of the highest skill, and paid salaries that would call forth their best efforts and constant thought and attention, whereas now none of them can have any one whose services are worth much. Colonization could then work to far better advantage because if the settler has his choice of many different localities he is not half so afraid of schemes and jobbery as he now is. Now a colonist is beset by the agents of other enterprises half starving for a "sucker" of any kind, and the result generally is that he is disgusted with the whole and goes somewhere else, or back home. If all were united, with men at the head who could not afford to lie, and were under no temptation to do so if they could, almost the whole of this, which is probably the greatest obstacle to settlement, could be avoided. It would add hundreds of thousands, probably millions of acres, of the most highly productive land to the producing power of our country, and make cheap homes for thousands in the cities that must soon be starved out of them. Philanthropy can have no higher aim than this, for vast areas *now supplied* with water *under good systems* lie as idle as the desert wastes still unclaimed around them; and thousands of strong arms and willing hands are in the cities wanting just such places yet not knowing how or where to find them, or how to get them.

CO-OPERATIVE IRRIGATION COLONIES.

JOEL SHOMAKER.

Co-operative is a union of individual interests for the benefit of the collective body and through that the mutual sharing of personal advantages. The practice of productive and distributive co-operation began a half a century ago in Europe and has extended throughout the representative industrial countries of the world. What is known as the Rochdale plan had its beginning among the cotton spinners of England in 1856, and was introduced into the United States on the organization of the Patrons of Husbandry or grangers. The chief object of such distributing co-operation was to dispense with the middlemen's profits by bringing producer and consumer, wholesaler and retailer into closer commercial relations through combining numerous orders for the same home necessities. In this manner it has been demonstrated that articles of home use, in daily demand, can be handled and all running expenses including interest on investment, rentals, clerk hire and dividends on capital stock paid promptly by charging the consumers 10% above actual wholesale cost.

While co-operation in distribution has resulted so beneficially to many thousands of wage earners the productive principle has not been so thoroughly tested. The introduction of modern irrigation and the necessity for colonial organization has developed active co-operative elements that otherwise might have remained dormant for centuries. There are no better illustrations of this fact than the successful reclamation of arid deserts by the Mormon pioneers of Utah and the primitive settlers of the Greeley colony in Colorado. In 1847 about 2,000 religious enthusiasts under the command of Brigham Young, crossed the great plains and located in the then barren and desolate Salt Lake basin. The land was almost destitute of vegetation, the soil parched and lifeless and the pall of a death valley seemed to overshadow the entire realm of aridity. Those strange wanderers knew nothing of irrigation or practical co-operation but the prudent goddess of necessity demanded that for self-preservation the colonists should unite their forces and construct canals for irrigating the desert in order that its fruitfulness might be enjoyed. The water was flooded over the dry sandy surface, the colony fields were plowed and immediately the germs of vegetation opened and the desert became a green sward.

The Mormons were alone, over one thousand miles from the base

of supplies of every nature, with no transportation facilities except the ox teams with which they entered the Great American Desert. There was no avenue of escape from absolute destitution and ultimate starvation except through a union of labor in producing the necessities of life and colonial distribution of the stores then at hand. In such a predicament there could be no individual isolation or class distinction, but the interdependence of social and moral life added to its duties the union of financial and temporal transactions. The land was divided and ditches constructed to carry and deliver water to every parcel or lot, regardless of money considerations. Gold and silver had no value not even the bullion worth, because those precious metals could not be used for any purpose whatever in purchasing supplies where none existed, or furnishing ornamental goods where there was no demand for personal adornment. Labor was made the basis for computing all business affairs and the physical powers of the carpenter, blacksmith, farmer and laborer, with his teams of oxen or horses constituted his available capital for personal and community investments.

Utah has over 300 irrigation canals, furnishing water for a half million acres, actually cultivated by 12,414 farmers, ninety per cent. of whom are independent of mortgages and free from land indebtedness. This has been accomplished through practical co-operation of men having no other capital than the labor of their hands and teams. The lands have been taken under different general laws, good and perfect titles obtained and the deserts surrounding the colonial settlements have been converted into profitable fields of alfalfa and cereals. Water taken from natural mountain streams and conveyed through co-operative ditches to the collective fields of distribution is an appurtenance to the land it reclaims and not an article of barter or commercial traffic. This prevents speculative individuals from hawking either land or water and thus maintains a stable ownership of real home makers who regard their lands as the most valuable intrinsic possessions obtainable. There have been but few land transfers under this system and the tendency is toward a continuation of the rule of perpetual ownership.

The Union Colony, at Greeley, Colorado, was founded in 1870 under co-operative plans and a most uninviting desert was entered and subdued by a union of individual efforts. That now noted city of famous potatoes and prosperous colonists has been built up by a strict adherence to the principles of productive and distributive co-operation. Men are not asked to sacrifice individuality or personal opinions in religious, social or political matters to co-operate in business transactions, but on the contrary stand as peers of humanity, examples of independence because of having the commercial assistance of the entire united community. One man may make a success of individual

irrigation and become wealthy through personal marketing of his products and purchasing of supplies, but the combining of one hundred similarly industrious characters insures greater profits in selling and less commissions in buying the necessities and comforts of life. Individual ditches are frequently more desirable and cheaper, yet the farmer, large or small, must depend upon his neighbors co-operation for the cultivation and marketing of crops and the many advantages over solitude and desert isolation.

In co-operative colonies the union of labor is carried into all the avenues of business. What is to the interest of an individual member is usually beneficial to the whole and where the collective body is stimulated each member feels the effect. Thus the colonial ditches are kept open to extend their assistance to all classes of consumers, regardless of wealth or social standing; roads are constructed into the canyons for fuel and timber and to the central marts of commerce; school houses are erected and independent educational facilities given every family because of the brotherhood of manhood being the foundation of the organization. The Utah colonies number three hundred and twenty cities, towns and villages and almost every place was made through co-operative ditch building and colonial union in every public enterprise. The mercantile interests have been built up by small contributions as stock in co-operative stores, where supplies of all kinds are handled at nominal profit and the surplus income divided among the patrons. This co-operative spirit has entered into the building of railroads, erection of telegraph lines, construction of woolen mills and numerous factories consuming home products and furnishing the demand for manufactured articles. Two of the largest sugar factories in the inter-mountain West have been built in Utah by the co-operative action of the people.

The Mormon church historian has prepared a statement of approximate results from fifty years experience in co-operation. These figures include estimates of all incomes and expenditures originating in the land which was their only means for sustenance when the colonies were formed. The closest calculation shows that not less than \$562,900,000 have been accumulated by the people and expended in various home and colonial enterprises. The estimate gives the average cost of establishing 10,000 farms of 27 acres each at \$187.50, or a total of \$75,000,000. This cost, of course, is reckoned in labor as no money considerations entered into such work when coin possessed no value. The cost of making irrigation canals and ditches is given at \$15,000,000, reckoned in co-operative labor. Expense of irrigating the reclaimed farms at \$24 each per annum is given at \$6,000,000, and includes only actual work. The cost of building co-operative factories is placed at \$5,000,000 in work and materials contributed as stock. Temples have cost \$8,000,000, the entire sum coming from

individual contributions. Churches and schools costing \$4,000,000, have been erected. A sum equal to \$10,000,000 has been expended in missionary work and an additional \$8,000,000 used to assist poor emigrants in removing to the state.

While the public expenditures have been necessary and continual the expense of individual families estimated at \$875 each per year, has amounted to \$35,000,000. The cost of building roads and bridges and opening the mountain canyons of commerce has been \$4,000,000. Indians were troublesome during the first few years of colonial history and the people were compelled to build forts and collect together for mutual protection, the expense of which reckoned at ordinary laboring prices amounted to \$5,000,000. After peace had been declared and the Indians had transferred their lands to the whites the redmen had to be cared for, furnished with provisions and clothing and their children educated, which has cost the Mormons \$2,000,000. An organized effort was made in 1857 to prevent what they regarded as a hostile army of extermination from entering the possessions called Desert and for this equipment and consequent removal to distant settlements there was an expenditure equivalent to \$6,000,000. The first few years of conquering the desert were attended by difficulties in the form of crickets, grasshoppers, locusts and rabbits that devoured crops to the value of \$2,500,000.

Many unsuccessful attempts at establishing factories for making iron, sugar, paper, nails, leather and cotton goods have been made at an expense of \$6,000,000. While this was being done and railways were not constructed the ox team freighting from the Missouri river and Pacific coast cost not less than \$8,000,000. An overland mail and express system was established, forts and posts built, and afterward abandoned at an expense of \$2,000,000. The cost of protecting this and feeding unfortunate California gold seeking emigrants was \$2,000,000, and later an additional \$3,000,000 was expended in building railroads and telegraph lines. Added to all the enumerated expense of colonization are items of \$2,000,000 for abandoned towns in Nevada and settlements in southern California and the Sandwich Islands; losses by fire and other incidents amounting to over \$12,000,000; taxes and cost of getting building material and fuel from the mountains \$18,000,000. This vast sum with the possible exception of \$10,000,000 taken to Utah by colonists, has all been made through co-operation of the original 2,000 settlers and those following them into the Salt Lake Valley. Without this union irrigation would be impracticable and except for irrigation the colonists would have starved and the desert remained victorious.

Utah may be termed a co-operative commonwealth, because the present 265,000 people population could not exist in any possible manner without a union of individual interests. This state has numerous

dividend-producing mines that have paid the owners profits ranging above \$50,000,000 in the past quarter of a century, but not one could have been opened and operated without the fruits of co-operative irrigation to feed and clothe the primitive prospectors and experienced miners. Brigham Young as chief prophet, seer and revelator of the Mormon church and recognized director in temporal and spiritual affairs, prohibited every form of chance and speculation in land and water and forbade the opening of mines within the borders of his territory. He could see that the desire for gold if left to individual impulse would destroy all co-operative elements and eventually rob the entire colonial organization of its bread-producing population. The first essential was the construction of ditches, irrigating and cultivating the land and building homes for the families. When this was accomplished and the colonies were independent of importations the same co-operative spirit which enabled them to build homes in the desert could be as successfully employed in opening the treasure vaults of the mountains. If the original settlers of Utah or the Greeley colony in Colorado had attempted individual home making without colonial union their efforts would have been wasted, their lives sacrificed and the deserts continued the homes of poisonous reptiles and roaming Indians.

AN INFORMAL PRAYER.

"The proper way for a man to pray."

Said Deacon Lemuel Keys.

"And the only proper attitude.

Is down upon his knees."

"No: I should say the way to pray."

Said Rev. Dr. Wise.

"Is standing straight, with outstretched arms,

And rapt and upturned eyes."

"Oh, no, no, no!" said Elder Slow:

"Such posture is too proud.

A man should pray with eyes fast closed

And head contritely bowed."

"It seems to me his hands should be

Austerely clasped in front,

With both thumbs pointed toward the ground."

Said Rev. Dr. Hunt.

"Las' year I fell in Hodgkin's well

Head first," said Cyrus Brown,

"With both my heels a-stickin' up.

My head a pintin' down:

An' I made a prayer right then an' there—

Best prayer I ever said—

The prayin'est prayer I ever prayed,

A-standin' on my head."

—*Lynn (Mass.) Item.*

WASTE LANDS IN EUROPE:--- THEIR UTILIZATION.

AN ARTICLE CONTAINING, POSSIBLY, IDEAS FOR
AMERICAN READERS.

BY LODIAN LODIAN, Paris, France.

Often does the writer exchange notes with an eminent English irrigation engineer on land-reclamation; and recently in response to inquiry, I "brot him out" very fully on the important subject of land-reclamation in relation to its being a possible solution of the unemployed question. So closely do his views agree with mine, that I reproduce them (after slight editing) almost *in extenso*,—their conciseness admitting of this.

I believe that a few rough notes on the land and farming will be useful to many of your readers, more especially in deference to the proposal to establish new laws by which portions of the land of England should be devoted to the welfare of the state and benefit of some of the people who worked it. Persons unacquainted with agriculture are apt to hear spoken of or read of waste land as if it were wasted land, and believes that in this country there are thirty millions of acres of waste land capable of tillage, or of being made into arable land.

If we first inquire into the situation, condition, and present use of these thirty millions of acres of land we shall be able to judge of the capabilities of improvement and prospect of remuneration to the workers under the best system of culture and cost of colonization aided by the government. Experience and observation prove that "waste land" is inferior in position and quality to the adjacent land—the best land, with good staple adjuncts (as roads and water) having been colonized by our forefathers years ago.

To begin with, the woodland—say ten million acres. A small portion of it could not be devoted to better uses than at present, yielding the finest oak, ash, elm, and other useful timber. But the greater part of the woodland of England yields timber suitable only for fencing and the roughest farm purposes, resulting from the nearly general neglect to trim and prune trees annually when very young; also from not planting young trees, but allowing them to grow up from the old *stubs* instead, by which there is a growth of inferior timber.

When young, these tracts of woodland are known as copice or underwood—useful for a variety of purposes in domestic manufacture,

and quite necessary for farm purposes. To clear this land of roots and stones after the timber and underwood were removed would cost not less than £8 per acre; to drain it and get it somewhat level, about £8 more; to plow properly and seed it, another £8—that is if your teams, men, dwellings and supply of provisions and water were near at hand and labor estimated at present prices.

It must be understood that there are proper seasons for all these various operations—as the winter for felling wood; any time would do for grubbing up roots and clearing, of course it would be winter as all labor is better employed at other seasons. Draining should be done at the end of autumn; plowing as soon as the draining is finished. On heavy soils the plowing must cease after the rains have set in, and only be done in the open weather. The crops should be either tares, rye, oats or potatoes; the yield in most cases would not be up to the average—perhaps a partial failure the first year. The next year should be fallow or have an extra dressing of nitrate manure. The cost of fencing off has not been estimated, as it might be done at any time.

Now comes the robust, happy harvest. According to the yield would be the cost of garnering it. Like seeding, i. e., planting, harvesting has its own critical season. This is a time when hands are scarce, but women and children all help usefully. Wages are about three times the ordinary rate; experience and good management are requisite; and on this occasion a “lord” is appointed by the men from among themselves to guide and control them.

Threshing and selling follow. Now look to the “Dr. and Cr.” account, and the first year may show improved land, but at a cost which would require three years of good farming to follow. After that the land might be considered established for cultivation.

Dwellings, barns, machinery and tools, roads, wells, cattle, all must be added as the farming progresses, these being done or supplied as time and money favored.

Here make an estimate of the cost of converting heath and moorland into arable land; the process is nearly similar, but the cost would not be more than half that of wood-land, but as a general rule the staple is not so good, nor would the gain to the community be so great, for the heaths and moors of England feed countless flocks of sheep and cattle, as well as horses, donkeys and geese of the cottagers residing in the verge of these commons. I may here remark that wages are higher in the vicinity of large tracts of common or waste land. There is a “kinder-sorter Hades-union” between the man and the land, on which he turns his little live stock; they help to keep him from being reduced to starvation wages and make him somewhat independent of his task-master.

Marsh-land would be the most difficult and uncertain to reduce t

arable land. I will not venture an estimate, but only the remark that large tracts of such ground might be brought to a high state of cultivation if the resources of science were made to act upon it. To be able to do this, the intelligent minds of earnest men are required to guide and influence the raw material of agricultural labor. At the outset this would be found to be a great want. There are so many Broughams, Westburgs, Edwards, Pallengers, Thadsons, Redpaths to do the patriotic, yet purloin grandly.

Again, if the attempt were made on the thirty million acres of waste land at once, where would the men be got to do it all in due season, unless prejudicially drawn from existing farms, to the material injury of our established agricultural property?

Farm laborers cannot be made out of town-bred men. Let any one who thinks himself apt at learning simple things, try his hand at a month's harvest—that is, cut, cart and stack; or wood-cutting.

With improvement in the condition of the land look forward to an unfair increase of rates and taxes under the present rule of government; for as property is improved, the rates are unconditionally raised as a sort of fine even, before the property has won its cost back.

The inference to be drawn from these remarks, tends to show that while there is great reason for the conversion of waste land into either good pasture arable land, it must be a growth of time, say fifty thousand and selected acres and by a selection of workers—the first year at the government's cost. A gradual increase of the acreage might be made each year afterwards. Private enterprise should be encouraged in every various way to aid in the same direction, for locating competent and worthy families on the land in tracts of not less than fifty acres for each family. Land of appropriate amounts should be advanced to those needing them for actual farming purposes.

A SOLUTION TO THE UNEMPLOYED PROBLEM.

This problem, from its vastness in relation to England, is on that account simple to understand with the view to the employment of every willing (and also unwilling) worker in this our England. Mark the very name of our country with its affix “and.” It tells at once the claims of duty of one and all to work for the country which sustains us, to work on and for English land; for England. Cease to be unemployed!

More than a seventh part of these Islands is lying idle. Is that policy or justice to those who are born to live on these islands? To coop people up in “dosseries,” model lodging houses, and the ranges of tenements that make up monstrous London and other cities and towns of the United Kingdom, and ask boroughs and parishes to find work for a million involuntary idlers, is to aggravate the evil; and, by enormous rates, bring down others struggling for existence to the

same unemployed level. To augment the £330,000,000 indebtedness of the counties, boroughs, and parishes of England and Wales is criminal. A wider spread of misery becomes inevitable, by adding greater numbers to the million idle hands now stretched out appealingly for work.

What is our position as a nation in such straits in the midst of peace? One of dependence for supplies of food for three months out twelve in the year, for which a million factory, mine and shop toilers are incessantly engaged manufacturing and exporting to get that imported food of foreign nations, of which we might produce the larger part.

A coalition of nations would dictate what terms they choose, or stop our food supplies in case of war. Then England would see how untrue it had been to the unemployed—would see that the 11,000,000 acres of waste-land would have yielded health, wealth and honor to the million unemployed, and yielded also an annual revenue of £11,000,000 rental, and lessened the rates for pauper and pauper official maintenance, by which the middle and poorer classes are bowed down. There are no paupers in Holland who are able to work: they may not beg, but may work on the state-farms at profitable industries, and may acquire land of the state when their toil has brought them a competence to hire or buy it.

Back to the land!—now relapsing into wild moorland and tangled brake. Back to the deer-forests!—once farm-land, now let at $\frac{1}{2}$ pd. per acre for shooting. Back to the England—that is becoming a bleak desert in places, once the home of happy yeomen and sturdy cottagers. This simple inexpensive plan would give new life to the nation.

On from ten to forty-acre farms, a quarter of a million houses would need building. Bridges and roads made: seed-trees planted: implements, furniture and some of the simple luxuries of modern life supplied. Schools, libraries, gas- and water-works: team and rail-roads created. None need be idle then—in fact should not be allowed to be, while work had to be done to produce food and wealth. One hundred and sixty million pounds now spent for food abroad might—some of it—be spent at home. Cottage and garden farming pay. The farm laborer produces twenty-five times more than he consumes: the super-flux would aid to make England contented and prosperous, and free many from the peril of sure starvation should war stop our foreign food supplies, or trade grow worse in England than it is at this moment.

A new crusade against waste-land should be preached, and none refused work who applied and were willing to cultivate the land of Britain and Ireland.



Residence of H. M. Wilson, at Chadron, Neb., and some of his fine stock. These bucks are registered Rambouillet, and five of them weighed at one year old 1290 pounds.

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs, Also sketches or plans of convenient and commodious barns, hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us improve the appearance of THE AGE?

GOOD ROADS.

Missouri has reason to feel proud of the fact that she was the first state to form an organization for the improvement of public highways. Eleven other states are now desirous of becoming members of this association, and it is to be hoped the motto of Missouri "Good Roads and Public Improvements" will be adopted by every state in the Union before the next annual convention.

It is proposed, by this body, to present to the 40th Assembly of the Missouri Legislature, the bill which has been prepared by the sub-committee. This measure provides for the creating of a "highway commission," said commission to consist of three competent men, appointed by the governor of Missouri, whose duty it shall be (briefly stated) to gather statistics as to the total mileage of highways, their condition, manner of construction and improvements; inquiry into the laws and methods of other states pertaining to highways, and in their own state shall inquire into the laws concerning highways and segregate such as they deem are ineffective from laws which are effective. The Act provides that the office of commissioner shall be strictly non-partisan. Many of the resolutions presented at the meeting of the association in November asked that the taxes be paid in cash deposing the present labor system. Thus every man between 21 and 60 years of

age should pay \$1.50 or \$2.50 annually for road purposes and all such work should be contracted.

Among the many good editorial suggestions, appearing in the *State's Duty* relative to the subject of road improvement, perhaps the best is the one referring to the utilization of jail prisoners for improving the public highways, instead of allowing tramps and vagrants to remain in idleness in the county jail, supported by the tax-payers. This seems such a common-sense suggestion that it ought to meet the approval of all (except, of course, the tramp) and would be the precursor, probably, of the use of convict labor at the penitentiary on roads.

The L. A. W. is a potent factor in the good road movement, and should receive credit for what it has already accomplished.

Speaking of good roads reminds me of an article that appeared in a late issue of the *Scientific American*. It was contributed by M. Meigs, U. S. C. E., Keokuk, Iowa, and suggested the use of oil on public roads. He presented this idea, as a possible way of improving bad roads, to the Good Roads convention, above referred to. What first gave birth to the idea of using oil was, like many other ideas, due to an accident. An oil pipe line along the side of a road in Pennsylvania sprung a leak and spouted a quantity of oil over the road. An observer

noted that at this point the road, hitherto extremely dusty in summer and equally muddy in winter, was now firm and very much improved. His theory to explain this was that the oil formed a water tight covering to the road and the earth below being dry, no ruts or mud could form.

Mr. Meigs became interested in the subject and recently made experiments with a tank of crude oil, which was placed at his disposal by the "liberality of the Standard Oil Company." Liberality is a word seldom connected with the Standard Oil Company, so let us give it due credit. Thanks, then, to the liberality of this firm, the experiments were made possible, and the results sustained Mr. Meigs in his belief that oil was instrumental in preventing mud and ruts. Those who have used oil say the roads are kept free from dust in the dry season and are hard and firm in the wet weather; surely results worth working for. Mr. Meigs urged the members of the Good Road Association to make experiments with oil in different sections, and gave four rules for applying it: The road should be smoothly graded and rounded well, so as to shed water; the roadbed should be dry when the oil is applied; it is advisable to roll the ground after the oil is put on; the oil from which the naphtha and kerosene has been extracted is more agreeable to use in warm weather, and the tendency of the oil to become too stiff in cold weather is overcome by a spraying apparatus, using a jet of steam.

STREET SWEEPINGS AS FERTILIZERS.

An interesting bulletin lately issued by the Department of Agriculture is the one which deals with the utilization of street sweepings. The sweepings from the city streets are either used as fertilizers, used to fill up low land, or are dumped in bodies of water without any attempt to make use of them. The letters received from those who have used street sweepings as fertilizers nearly all go to prove the util-

ity of them for the purpose. Out of the sixteen letters given, from different sections of the country, only one did not consider it a profitable plan, and his objection was that the cost of transportation from the city of New York to his farm, 35 miles distant, was too great to make it pay. One farmer says they are worth two-thirds as much as any stable or cow-pen manure where straw is used for bedding. The sixteen cities that report the sale of their street-sweepings, give varying prices, 15 cents per ton being the lowest and \$2 00 the highest. The city of Atlanta sells her street sweepings by contract for \$60.00 per year and finds this a satisfactory arrangement as the street-cleaning department has the advantage of a short haul.

H. W. Wiley, the chief chemist having charge of the experiments made in this line, is desirous of obtaining further information on this important subject and to that end invites the correspondence of persons interested in the subject, and, with farmers and gardeners who have used street-sweepings.

MORE COFFEE.

A. P. Austin, Chief of Bureau of Statistics, Treasury Department, Washington, in a recent report says: "More coffee and less tea, or a substitution of coffee for tea, seems to be the rule with the American people just now. The figures of the Treasury Bureau of Statistics show that the coffee importation of the past year has been the heaviest in the history of the country, and the tea importation the lightest in many years. The importation of coffee in the calendar year 1897 was over 800,000,000 pounds, and the 1898 figures will be about the same as those of 1897. In no earlier year were the importations ever as much as 700,000,000 pounds. This is a larger amount of coffee for each individual than was ever before consumed in the country, the per capita consumption being about eleven pounds annually, while no earlier year showed a

per capita consumption of as much as ten pounds. Reduced to tons, the total for the year 1898 would be 400,000 tons, requiring for its transportation 27,000 cars, which, if grouped in a single train, would nearly reach from New York to Baltimore. The United States is by far the largest coffee consuming country in the world, our own consumption being nearly double that of all Europe, and practically half of the coffee produced in the world. In only two countries—Holland and Denmark—is the per capita consumption larger than that of the United States, that of Holland being 23 pounds per capita and of Denmark 15 pounds against 11 pounds per capita in the United States, 5½ pounds in Germany, 3½ in France, and less than one pound per capita in Great Britain.

These figures are especially interesting in view of the fact that coffee can be successfully grown in all of the islands which are just coming into closer relation with the United States. It is now the largest article of export from Puerto Rico and the production there can be greatly increased since a very large proportion of the island is capable of producing coffee, which grows most successfully on the highlands and mountain sides. In parts of Cuba conditions are similar, and at one time the coffee production of that island amounted to nearly 100,000,000 pounds annually, though after the introduction of the sugar industry, it practically disappeared, sugar growing being more profitable. In Hawaii coffee is being successfully grown, and the area there can be materially increased, and the same is true of the Philippines."

THE BEST SEEDS ABSOLUTELY NECESSARY.

We cannot too strongly nor too often urge the supreme importance of planting seeds that are perfectly pure and fresh. Seeds that are offered at cheap prices are almost invariably of doubtful origin and uncertain age, sure to cause the planter disappointment and loss. The thought-

ful planter's only surety lies in buying seeds sent out by a conscientious and trustworthy house. A vast number of American gardeners have (and have had for years) the utmost confidence in seeds that bear the name, D. M. Ferry & Co., Detroit, Mich. The present generation of planters can hardly remember the time when Ferry's seeds were not on sale everywhere each year and as regularly planted by thousands—with the greatest faith in the unvarying quality of the seeds and in the integrity of the firm that grew them. Every planter, whether already a buyer of Ferry's seeds or not, should send for Ferry's Seed Annual. It is mailed free to anyone who writes for it.

THE BEET IN UTAH.

The Utah Sugar company, of Lehi, Utah, has declared a dividend of five per cent. On Christmas day the factory closed, after having used 43,150 tons of beets from which 9,500,000 pounds of sugar have been made. Stock will bring \$12 50, which is 25 per cent. above par, but there were no sellers. The stockholders anticipated only a dividend of 2½ per cent, so that the larger one was an agreeable surprise.

The latter part of December Mr. George Austin, the agricultural superintendent for the Utah Sugar Company, began making contracts with the farmers in Salt Lake and Utah counties for beets for next season. In Salt Lake county 800 acres of beets are to be planted, while all told there will be planted in the two counties 600 acres more than last year. Last year the price per ton for beets delivered at the factory was \$4 25. This year, however, the contracts provide an advance of 25 cents per ton delivered during September and October.

FEED GROWING SCARCE.

Joe Duling, of the firm of Duling Bros., Canfield, Wash., says of the outlook for wintering stock in that state:

"The present cold spell, which is un-

precedented for severity and length at this season of the year, has frightened many stock men, who fear they will not have sufficient feed to last through the winter. This has caused a rapid advance in hay, with the prospects that it will advance to such a price that stock men can not afford to buy, and will be forced to place their cattle on the market. Rye hay is now selling in that vicinity for \$5 per ton, and there is a good demand for it. Sheep men are buying all the rye hay they can get, and if the cold weather continues the supply will be exhausted soon. Then many cattle will be forced on the market and the price will go down.

Should snow be followed by a chinook wind the situation will be relieved, for stock can then get considerable feed on the range. We have sufficient hay to feed 85 days, which is 20 days longer than we have ever been compelled to feed in the 16 years we have been in the business. But there are many other stock men less fortunate, who have not more than enough hay to feed 30 or 40 days.

The country about Winona and Endicott is filled with sheep, flocks ranging from a few hundred to 15,000 head. Owners are becoming alarmed, for sheep can not rustle feed in the deep, hard-crusted snow which now covers the ground. Sheep men have been making money during the past two years, the price of sheep and wool being nearly doubled during that time. Common sheep are now worth from \$3 to \$4 per head, and there are not many offered for sale.

As the range becomes fenced in sheep men are turning their attention to improving the quality of their flocks, importing blooded sheep. I know of one sheep man near Winona named Trobe who, two years ago, imported a lot of blooded rams. Last spring he got his first crop of graded lambs, and has made a small fortune already by the charge. He has 800 ram lambs of last spring's crop for which he has been offered and refused \$5 each, and is holding for \$8 per

head, which he is positive he will get before the lambs are one year old. Common lambs are worth from \$2.20 to \$3 each. Mr. Trobe says the blooded sheep did not cost him a cent more to raise than the others, and he has a nice balance on the credit side of the ledger in favor of blooded sheep. His example will be followed by other sheep men, and in a few years there will be less sheep in this country, but they will represent an equal amount of money as the large flocks and the profits will be greater."

SENSIBLE SUGGESTIONS.

In his address on "Storage Reservoirs" at the fall meeting of the California Pomological Society, Hon. Geo. H. Maxwell said the construction of storage reservoirs for the arid regions was "just as much a matter of national concern as the improvement of rivers and harbors and it is only just, as between all the States, that the arid States and Territories should have their fair share of the grand aggregate of annual disbursements by the federal government for internal improvements, and that their share should be used to build storage reservoirs within their own boundaries.

The great merit of this solution of the problem of water development is not only that it provides water without a corresponding burden of debt, but that it provides it through a machinery already created and in operation. All that is necessary is for Congress to insert the necessary appropriation in the River and Harbor Bill, and the War Department of the government already has the most competent corps of engineers in the world ready to take up the work of construction. * * The way to do this is by co-operation and organization. It is only by constant agitation and a united public sentiment and demand that we can secure the inauguration of this policy. The more vigorously the crusade is carried on the sooner will success be achieved."

Continuing Mr. Maxwell said, "While

we are agitating our needs for artificial storage reservoirs we must not lose sight of those which nature has given us. The forests on our mountain sides which check the rapid run off and evaporation which takes place where the mountains are barren, hold the water back until it can percolate into the earth and gradually find its way through subterranean channels to the points where we lift it from wells for use. * * * if we do not stop the destruction of our forests, we will find too late that 'The tree is the mother of the fountain,' and the underground water that is being so rapidly developed will fail utterly."

ROUGH ON THE HOGS.

Here is the way the Tamworth breed of hogs is described by the *Indiana Farmer*: "Tamworths are a slab-sided, long-legged, big-headed, lardless, unlovely, red, rusty or sandy, half-civilized sort, from England." Rather rough on the Tamworths.

SECRETARY WILSON'S VIEWS OF THE SOUTH.

Secretary Wilson accompanied the president on his recent trip through the South. As usual he kept his eyes open to the agricultural conditions. From an interview reported by Wm. E. Curtis in the *Record* we may make some interesting extracts.

"The cotton-grower," says the secretary, is no more to blame than any one-crop man. All suffer when the product is larger than the market. I wish the southern people could realize, as I do, how well adapted their soil is to the production of domestic animals. Yet each of the gulf states spends in the neighborhood of \$500,000 a year for mules brought from Missouri and the states farther north. They could breed them at home just as well. Grasses can be grown that are entirely suitable for fodder, the climate is mild, so that the animals do not have to be sheltered, and the pasturage can be had all the year round. During the hot season an abundance of fodder could be afforded by growing such legumes as cow-

peas, sand vetch and the velvet bean. Georgia last year produced 6,000 tons of cotton seed, enough to fatten all the 400,000 head of cattle which we shipped abroad. If mixed with cornfodder, crabgrass or any other nutrient, it is the best kind of fattening material."

The Redland (Cal.) Horticultural Club met in that city, Dec. 14, and held an interesting session. A law on the manufacture and sale of fertilizers was formulated by the committee appointed for that purpose; the most important sections of which were the ones which provides that all brands of fertilizers sold within the state, be analyzed by the Director at least once a year; that all packages of fertilizers be labeled with name, brand and trademark, address of the manufacturers, weight and chemical analysis of the fertilizer.

A resolution urging the immediate construction of the Nicaragua canal was unanimously passed by the society, whose next meeting is to be held Jan. 11, 1899.

Myron Reed says: "A small, compact, occupied home has never been the ambition of the American. He has desired more land than he can use, more house than he can occupy. The five and ten acre farms near Milwaukee, tilled by Germans, yield a living and an income. Seldom the cloud of mortgage darkens one of these little cultivated spots of Wisconsin earth. The American with a big farm usually despises a garden. Not many years ago a Californian said to me that he could ride horseback from San Francisco to San Diego, 700 miles, and sleep on his own land every night. He cannot do it now. But even now there are big, half-cared for farms in California." This day is happily waning, however, and it is the dawning hour of small farms well tilled, under a convenient system of irrigation.

An ounce of thoughtfulness is worth a pound of apology.—Ex.

PULSE OF THE IRRIGATION INDUSTRY.

THE BEAR RIVER VALLEY SYSTEM.

The past dry season has demonstrated to California people that irrigation is one of the things they cannot do without. This has been brought home so forcibly to the dwellers of Redland, Cal., that they propose a radical reorganization of their irrigation systems, and intend consolidating all of the water companies south of Mill Creek Zanja under the Bear Valley system. It is intended to place the Bear Valley system upon a paying basis, clear off present indebtedness and make good legal water rights now standing against the system; that the new company will not pay any dividends to stockholders until all debts are paid, and that eventually the system, free of debt, is to become the property of the water users. The man to whom the people look to assist them in this project is George Chaffey, one of the oldest irrigation engineers of the state, who founded the Etiwanda and Ontario systems and who was also the founder of the first and largest irrigation enterprise in Australia. Among the improvements to be made in the Bear Valley system if a satisfactory arrangement can be made, is a new dam, 120 feet high to be built just below the old one, for the purpose of forcing the water on the Mojave desert.

AN INTERESTING DECISION.

A decision recently given by a Colorado judge will doubtless be of interest to all irrigation farmers. Suit was brought to restrain a farmer from digging a ditch between an irrigation canal and the river to intercept the seepage before it could reach the stream. A restraining order was granted by the court and a decision rendered to the effect that no one is entitled

to the use of water unless it is taken from the river in the usual way.

A GOOD SUGGESTION.

In the Pecos Valley, N. M., there seems to be some difficulty in securing a suitable location, at reasonable figures, for the penitentiary farm, and this has moved someone to write to the *Grand Falls New Era* an article whose suggestions might be applied to any section of the west and southwest with profit. The writer says he cannot understand why the state should go to the expense of buying back land which she gave away only a few years ago, when she has millions of acres of her own that only needs the application of water to make it the most productive in the state, and suggests that this land be so improved and developed. "The census reports of 1890 show that the first cost of the irrigated system of the eleven arid states and territories, exclusive of the first cost of the land, to be \$29,611,000, and their assessed value to be \$94,412,000 showing an increased profit of \$64,801,000 which is equivalent to 219 per cent on the original investment, which ought to be enough to satisfy the state of Texas, the land of big ideas.

By the same authority we find that the average cost of bringing water to this land was \$12.95 per acre. The average value of these water rights is \$39.28, the difference of \$26.33 is the net profit to the owner of the water.

The employment of the state convicts in developing a system of irrigation, would not conflict in the least with free labor. The farm after it has been put in good shape, could be turned over to the officers of the experiment station and in this way

three great results might be obtained, that is, the convicts could be made self-sustaining without encroaching on the domain of free labor; secondly, a great variety of food could be raised for the eleemosynary institutions of the state; third, the establishment of an experimental station in the arid region might be of incalculable value to the state, as it is possible that science will discover products capable of being raised at a great profit upon these arid lands without irrigation."

THEY CAN BE IRRIGATED.

O. R. Holcomb, commissioner of arid lands in Washington, in his report to the governor and legislature of 1898, under the head of "General Remarks," claims that the department of irrigation and arid lands is second to none in the state.

It is estimated that there are about 3,000,000 acres of arid lands in the state, and of these at least 1,000,000 acres can be profitably irrigated. As the demand for land and the products of the irrigated lands increase, an additional million acres may afterwards be economically irrigated. Experience has demonstrated that irrigation, under control of the state, is most economical and satisfactory to the farmers, and that when properly controlled, irrigated farms are the most profitable as well as yielding the greatest returns. It is therefore suggested in the report that the state take control of all irrigation development as is done in Wyoming and other western states, to the extent of regulating the use and distribution of the streams and bodies of water, keeping in view vested rights and the rights of prior appropriations.

If the department of irrigation or some other department of the state were charged with the duty of administering equitable and wholesome laws in relation to these matters, it is believed that irrigation development would rapidly increase and take large proportions, as well as adding to the certainty of farming by irrigation, and

consequently to the profit of the farmer.

In support of the plea for spending more money and attention to be devoted to irrigation in the state. California is cited as having spent millions of dollars in the development of her irrigation enterprises and the reclamation of prairie lands. More money has been spent in that state for one dam and storage system than is required to run the entire state government in this state in two years. That it is profitable to spend money for irrigation purposes there can be no question. One acre reclaimed and put into cultivation under irrigation will produce more than three acres, on an average, in the regions where irrigation is not an absolute necessity.

Construction works, under a co-operative method, is an excellent thing, if it can be done, but when materials such as lumber, iron, machinery, etc., are required to go into the construction, it is necessary to go into even the commercial world, and one must then have the cash. It is therefore hoped that irrigation development will be assisted by necessary appropriations asked.

The expenses of the department of arid lands from November 1, 1896, to November 1, 1898, including commissioner's salary and incidental expenses, are \$5,036.81. Owing to the uncertainty as to the status of the commissioner of arid lands from the passage of the act of 1897, approved March 19, 1897, relating to arid lands, no work was conducted by the office until the decision of the supreme court determining the status of the commissioner. A change was thereafter made by the appointment of the present incumbent March 29, 1898, and further litigation to determine the legality of the appointment was undergone before any further work could be commenced. The last litigation was ended in May, 1898.

It's a poor farm that can't acquire a mortgage.

WITH OUR EXCHANGES.

IN MCCLURE'S MAGAZINE

for January, Simon Lake, inventor of the latest marvel in the way of submarine boats, describes the construction of his boat, and how he makes long journeys in her at the bottom of the ocean, and while there steps out of her by an open door into the very sea, and examines wrecks and fishes up cables and so on. Mr. Ray Stannard Baker, in the same number, gives an account of his own experiences on a submarine voyage in the Lake boat; and both articles are illustrated with drawings from life by Mr. W. D. Stevens, who also made the voyage in company with Mr. Baker.

Miss Tardell gives an account, drawn from new and original sources, of the inauguration of Lincoln as President in 1861, and describes the first days of the new administration, when Lincoln began to exhibit his full power and sagacity as a statesman, somewhat to the surprise of the whole country, and especially to the surprise of Mr. Seward, who was at first disposed to be very fatherly towards Lincoln. This number also contains the second story in Kipling's new serial of school-boy life, and stories by F. Nesbit and W. A. Fraser. Stephen Crane contributes to the same number what will, no doubt, be found the full equivalent of a story—a description of a ride he took on the engine of the Scotch Express, the fastest train in England.

THE FORUM

Begins the new year with an excellent number. "The Race Conflict at Wilmington" is discussed by Mr. H. Litchfield West, a prominent newspaper correspondent who personally visited Wilmington and gives the results of his observation in a very impartial manner. He said he found a "very remarkable condition of affairs. The city might have been preparing for a siege instead of an election. * * * * Nearly two thousand Winchester rifles had been purchased by pri-

vate citizens; and scarcely a man in the entire city retired at night without a weapon of some kind—rifle, shot-gun, or revolver—by his bedside." The article by Byron C. Matthews, "A study in Nativities," containing statistics regarding the percentage of native, as compared with foreign-born, criminals and paupers, in the United States, is not only interesting but especially gratifying to Americans in its conclusions. Miss Julia Bulkley does not think it will spoil the child to spare the rod. She favors the banishment of corporal punishment from the school, as she believes that "harshness begets harshness, hardness and cruelty." Among other subjects treated of in this number are: "Life in the Klondyke," "San Francisco's Struggle for Good Government," "Our Future Relations with Great Britain," written by Sir Charles Dilke; and "The Liquor-Company System in Norway."

THE REVIEW OF REVIEWS.

The January number marks the beginning of a new volume, as well as a new year. The editorial department gives a brief review or retrospective glance over the two years past. The year 1897 was described as one which closed upon "a vast deal of unfinished business," of which 1898 witnessed the accomplishment. What this country has already done, the general effect it has had upon the world at large and what the possibilities of the future may be, combine to make this department of great value. A short sketch is given of General Calixto Garcia, who died in Washington, D. C., Dec. 11th, of pneumonia. There is something very pathetic in the death of this great Cuban leader, who for thirty years struggled against Spanish tyranny and then, like Moses, died just as he had led his followers within sight of the promised land. His justice, his respect for bravery, even in an enemy, and his many other admirable qualities

are set forth in this sketch, and portraits of himself and family add to its interest. W. T. Stead's impression of the Czar is another article of especial interest. His first impression of the Czar was summed up in the answer he made to a princess at the court who asked his opinion. His reply was, "I thank God for him! If he be spared to Russia that young man will go far." Subsequent meetings have but confirmed Mr. Stead's good impressions, and he thoroughly believes in "Nicholas II, Czar of Russia" as a monarch who has the best interests of his people and kingdom at heart, and he believes that the peace manifesto, so much talked about, was sincerely meant by the emperor.

SCRIBNER'S

In addition to the stories, among which are "Search-light Letters," "The Peach," "The Muse's Tragedy," etc., the January number contains an account of "The Rough Riders" by Theodore Roosevelt, which deals with raising the regiment and will be continued in subsequent numbers. The frontispiece is a drawing of Col. Roosevelt by Charles Dana Gibson. The article abounds in good illustrations. Richard Harding Davis contributes "On the FeverShip." The letters of Robert

Louis Stevenson are to be published in the magazine, the first installment of them, dealing with his early engineering excursions, appearing in this number, with an introduction by Sidney Colvin, to whom has been entrusted the work of preparing Mr. Stevenson's Life and Letters for the press. Admirers of Stevenson will be glad of this opportunity to get a glimpse of his personality, such as letters to family and friends always afford.

The holiday season is generally marked by the especial attractiveness of publications; the best stories, the finest illustrations and the daintiest of covers being used by the publisher in getting out the Christmas and New Year's numbers. As to covers, probably the most elaborate and expensive of any that came to our desk was that of the *Implement Age*. It is certainly a handsome one. The inside abounds in artistic "ads" and fine illustrations, making the Christmas number a work of art, surpassing their holiday number of last year.

The *Indiana Farmer* gives its fifty-third annual greeting to the public through its December issue. The turkey and holly are advantageously used in the colored cover.

A THANKSGIVING.

Thank God for brains; and for the plan

That hid them far below the brink

Of bitter cups. The happy man

Has never learned to think.

Thank God for pluck—unknown to slaves—

The self ne'er of itself bereft,

Who, when the right arm's shattered waves

The good flag in the left.

Thank God for humor. Still unborn

Is he who is not truly blest,

Who makes the point of many a thorn

The point of many a jest.

Thank God for pity—for all men—

For fellow fool and fellow clod;

And if the gods are cruel, then

Thank God I'm not a god.

ODDS AND ENDS.

A STRANGE SECT.

Some time ago a gentleman from New York visited Eddy, N. M., for the purpose of presenting a proposition to locate somewhere in the Pecos Valley, a colony of Russian Jews, the adherents of a very peculiar religious sect. The proposal to locate them in New Mexico did not meet with an enthusiastic reception from the inhabitants of that state, so the colony, numbering about 10,000, will have to be located elsewhere. The sect is known as Dhorkhoboristi, the word meaning "spirit wrestlers." They deny the existence of a personal God and claim that the doctrine of the Trinity means memory, reason and will, instead of Father, Son and Holy Ghost. They believe in the immortality of the soul, but assert that a new born child has no soul, the soul not entering the body until the fifteenth or sixteenth year of age. The sect has been subjected to much oppression from the Russian government, probably on account of their peculiar religion, and Count Tolstoi has been prominent in attempting to relieve them. It is his plan to colonize the sect somewhere in the United States, and he has obtained the consent of the Russian government to their emigration, as soon as plans for their location can be perfected. Colorado is spoken of as a possible site.

BILL NYE'S COW.

The *National Advertiser* says that had the late Bill Nye confined his genius as a humorist to advertising he would have doubtless attained even greater success than he did in the literary field. Here is a sample of what he could do in the advertisement line when he wanted to dispose of a cow: Owing to ill health, I will sell at my residence in township 19, range 19, according to government survey, one plush raspberry colored cow, aged 8 years. She is a good milker and is not afraid of the cars or anything else. She is of un-

daunted courage and gives milk frequently. To a man that does not fear death in any form she would be a great boon. She is very much attached to her house at present by a stay chain but she will be sold to anyone who will agree to use her right. She is one-fourth shorthorn and three-fourths hyena. I will throw in a double barreled shot gun which goes with her. In May she generally goes away for a week or two and returns with a tall red calf with wabby legs. Her name is Rose. I would rather sell her to a non-resident.

A FEW RULES.

A genius has gotten up the following postoffice rules which might apply at Sidney. Here they are: No letters will be delivered until they are received. If you don't get a letter or paper on the day you expect, have the postmaster look through all the boxes and down cellar also. It ought to be there somewhere and he likes to hunt for it just to please you. If your friend don't write cuss the postmaster. He is to blame. If he tells you there is no mail for you, put on a grieved expression and say "there ought to be some." He is probably hiding your mail for the pleasure of having you call for it two or three times a day. Ask him to look again.

COW-BELLS.

One of the comparatively few things that the hand of improvement has not touched is the cow-bell, which is made now just as it was fifty, a hundred, and more years ago, and has now just the same peculiar clanking sound as ever. Cow-bells are made, some of copper and some of composition metal; but most of them are made of iron and finished with a coating of bronze. The cow bell is not cast; it is cut from a sheet of metal which is folded into shape and riveted. The metal loop at the top.

through which the strap is passed, is riveted into the bell. Cow-bells are made in ten sizes, whose sounds range through an octave. Sometimes musical entertainers who play upon bells of one sort and another come to the manufacturer, and by selection among bells of the various sizes find eight bells that are accurate in scale.

There are only four factories in the United States in which cow-bells are made and in each case the cow-bell is only an item of production among many other things. Cow-bells are sold all over the country just the same as ever, but much the greater number are sold in the South, and Southwest and the West, where farms are larger, less likely to be under fence, and cattle are more likely to stray. There are sold in those parts of the country a hundred dozen cow-bells to every ten dozen sold in the East. American cow-bells are exported to the various countries of South America and to Australia.

A new find on the Okanogan river in Washington has been bonded to New York capitalists for \$300,000. It has just been discovered that Washington is to be one of the richest states in the Union for gold.

ANNEX ARID AMERICA.

The *California Mirror* likens the people living east of the Mississippi to the dog in fable, who dropped the bone he had, in the trying to secure the shadow he saw in the water. Thus many, in gazing at the distant Philippines overlook entirely the possibilities of the land that lies between. Mr. Geo. H. Maxwell has sounded the right chord when he says "annex arid America," and this sentiment is echoed by hundreds. "The people of the Philippines are an alien race and must ever remain so. * * * * In arid America all this is reversed. The people who will dwell in the homes into which the deserts may be transformed with water, will be American citizens, men and women of our own race and blood," says the *Mirror*, and all that is needed to bring about this redemption of the desert is to follow out the suggests made by Capt. Chittenden in his report, that the arid states and territories be given

their fair share of the sums disbursed by the national treasury for national improvements, to be expended in building storage reservoirs in those states where there are no rivers and harbors to improve. And in this way save the storm waters for irrigation purposes instead of allowing it to flow down in disastrous floods.

Dun's Review says: December is adding a surprising close to the most surprising year of American history. November had surpassed all other months of the century in volume of business and production, and thus far December is doing even better, in payments through clearing houses, in railroad earnings, in foreign trade, in output of pig iron, and in activity and strength of securities. But that is saying a great deal for in all these and other tests November was for the best month in American financial history.

If expectations are realized the Greenhorn Mountain, in Colorado, will be overrun by prospectors for gold in a short time. Already the roads leading to the reported find are thronged with eager miners and tender-feet. Arriving trains are crowded, and as soon as they step off at the depot in Canon City, they quickly don their overalls and jumpers and start for the Greenhorn.

Colorado Springs, Colo., is expecting to be enriched up in the millions by the finding of a rich gold mine in the Trickler tunnel that is being driven through Pike's Peak to increase the water supply for the city.

From the Convention number of *The States Duty* we quote as follows:

"We want good roads, clean streets, practical levees, trees planted in city as well as country, better farming, necessary drainage, irrigation, and broader educational facilities, and the people will be prosperous and happy. The cranks who preach civil war and other destructive calamities will talk to vacant seats. The honest man will have work and be glad to do his share."

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This Railroad has for sale the finest farming and timber lands in the South, at astonishingly low rates and upon easy terms, in the states of Tennessee, Mississippi and Alabama; also government lands subject to homestead entry. Improved and unimproved farms. Most delightful and even climate in America. For descriptive matter and full information apply to Alabama Land and Development Company, Mobile, Ala.

Excursions at low rates run from St. Louis, Mo., Cairo, Ill., and intermediate points as well as other points in the north, on several days in each month. Tickets allow stop-over at any point south of and including Cairo, Ill. Low one-way rates also, for settlers and household goods and stock.

For information as to tickets, rates, etc., apply to Chas. Rudolph, D.P.A., Room 351 Marquette Bldg., Chicago, Ill. R. Carroll, V. P. & G. M., Mobile, Ala., E.E. Posey, Gen. Pass. Agent, Mobile, Ala.

Do you want to go East?

Or would you like to exchange your western holdings for property in the Middle States? The people of this country are perpetually restless, ever seeking a change, sometimes in search of a better climate but more frequently in the hope of bettering their condition, and consequently good exchanges can always be effected between the different sections. If you have farms, ranches, orchards, stock, timber lands, city property, etc., and want to exchange for property in the Eastern or Middle States, consult me, and I will assist you.

J. S. PAINTER,

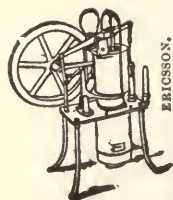
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RESERVOIR SITE, BIG HORN MOUNTAINS, WYOMING

THE IRRIGATION AGE.

VOL. XIII.

CHICAGO, FEBRUARY, 1899.

NO. 5.

THE PROGRESS OF WESTERN AMERICA.

**Shall It Be
Annexation?**

There are so many things to be considered, so many issues to be met, in forming an opinion as to the best policy to pursue in relation to the newly acquired territory of the United States, that the more careless are inclined to echo the sentiment of the little verse:

O Dewey at Manila,
That fateful first of May,
When you sank the Spanish squadron
In almost bloodless fray,
And gave your name to deathless fame;
O glorious Dewey, say,
Why didn't you weigh anchor
And softly sail away?

And by so doing leave no vexing questions to perplex us.

But Dewey did not "sail away" and so we have issues to face which it is cowardly to evade. Far be it from us to give the impression that we regret such being the case! We rejoice in Dewey's victory. Through it the United States has not only obtained valuable possessions and gained a much-needed station in the Orient but has also forced European nations to recognize her power by land and sea.

Let us not be confused by the cries of "Contrary to the Monroe doctrine! Contrary to the principles of Geo. Washington! Contrary to the Constitution!" which are constantly heard, but, laying aside sentimentalism, let us consider the question practically: The Monroe doctrine was intended to prevent the encroachment of foreign powers in the western continent; it is a fence built to keep out intruders, not

a prison wall to shut in the dwellers. The doctrine of "non-intervention" as promulgated by Geo. Washington is as wise a measure today as it was years ago; we should neither become entangled in the quarrels of foreign nations nor form alliances with foreign powers. But the right to acquire territory and to defend it, the right to protect Americans, no matter in what portion of the globe they may be, is not denied us by the non-intervention theory.

Do we believe in annexing the Philippines? If by "annexation" is meant conferring upon the Filipinos privileges such as the people of the United States possess, most emphatically no! Let a government best suited to their needs be given the Filipinos; and as soon as they are capable of it give them self-government, as it is proposed to do with Cuba; and Dewey is credited with saying that the Filipinos are more capable of governing themselves than are the Cubans. Theorists get all worked up over the thought that if such a government is exercised over these islands it will be unjust, that it will be "taxation without representation;" it will savor of monarchy; and lastly it will be contrary to the Constitution. It is *not* contrary to the Constitution, or if it is, then the Constitution has been violated these many years. Should we give to half-civilized races, living on the other side of the globe, privileges which are denied to thousands of intelligent Americans? Would it be any more unconstitutional for

the Filipinos to be governed by a country whose laws they do not make and in whose affairs they have no voice, than for American women (east of the Mississippi) to be obliged to obey the laws and pay the taxes of a country in whose government they have no voice? Is not this "taxation without representation?" The old saying is that "Charity begins at home," and another equally true one is that "we should be just, before we are generous." This is not intended as a plea for woman's suffrage but simply to draw attention to the fact that the Constitution is not now literally obeyed.

Territories have never had equal rights with states. J. B. McMasters, in an admirable article, in the December *Forum* on "Annexation and Universal Suffrage" says: "The Constitution is made for the states, not for the territories, and does not extend to them. What else is the meaning of the words, 'The Congress shall have power to * * * make all needful rules and regulations respecting the territory or other property belonging to the United States?' Is not the grant unlimited?" Does it not imply the right to acquire territory?

If the actions of the government in the past may be taken as the established precedent, then the Constitution is intended to apply to the states only; the territories belong to, but are not a part of, the United States and Congress has a right to give them the government it deems most expedient for them. Instead of arguing for the conferring of what might, perhaps, be a doubtful blessing, upon the Filipinos, would it not be wiser to devise measures looking to their immediate welfare? This is our manifest duty. Congress is bound to provide the best possible government for these people and they should be under the protection of the United States.

As suggested in a previous issue, a good plan would be to establish a "colonial bureau," whose duty it should be to investigate the conditions and needs of our territories, for they differ materially from those of our own country, and devise means for remedying existing evils. If the term "colonial" offend some other might be substituted, provided only that the object remain the same.

Too Much Water

"Not how much, but how well," should be the motto of the irrigator; not how much water you use but how you use it and the cultivation the ground receives afterwards is what counts. The general tendency of the beginner is to use too much water, his feeling being that in order to "get his money's worth" he must flood the land. Any suggestion to the contrary is regarded with distrust by many, says Mr. Whitney in his Bulletin on Yellowstone Valley, "as a possible device of the ditch management to restrict the use of water in order that it may go further and supply a larger number of customers." This evil was spoken of by T. S. Van Dyke, in the January number of the AGE, in his article on "Unprofitable Irrigation Works," in which he says: "The kindness of companies in putting no restrictions on the use of water before increasing settlement called for them has been an injury in almost every case. Thousands of acres have thus been alkaliied and damaged in various ways." Alkali soil—that is soil in which there is such a great deposit of the alkaline salts as to render it acid—has become so common in the irrigated districts, that it was deemed advisable by the Department of Agriculture, to make investigations concerning this evil, with the view of remedying it if possible. It was with this end in view that the work was undertaken by Hon. Milton Whitney, Chief of Division of Soils, making the first examination in Yellowstone Valley, near Billings, Mont., acting upon the advice of the land commissioner of the Northern Pacific Railroad at St. Paul, Minn., in selecting this section, as he stated the rise of alkali in the soils threatened serious trouble.

The results of the investigation is embodied in a handsomely illustrated bulletin, copies of which were kindly furnished the AGE by Mr. Whitney.

"It must not appear to those unacquainted with the subject," said Mr. Whitney in his introduction, "that the use of alkali and the disastrous effects following the application of irrigation waters is peculiar to the Yellowstone Valley. These are problems which have to be confronted in all arid regions the world over and where

ever irrigation is practiced * * * * * All of the irrigation districts of the country contain more or less alkali and are subject to the evil effects of over-irrigation."

Since this is true, and since so much valuable information may be obtained relative to this subject from reading the results of Mr. Whitney's researches, we would urge all our readers to send for a copy of this Bulletin,—No. 14, "The Alkali soils of the Yellowstone Valley,"—which is intended for general distribution among farmers who apply for it. It was found impossible to supply the great demand with the limited number of the illustrated bulletin, so a simpler one has been prepared which may be "had for the asking," so long as the supply lasts. It is something every irrigator should read. Send at once to Milton Whitney, Chief of Division of Soils.

Our War "Heroes"

The press throughout the country is unanimous in condemning the disgraceful war scandal that is bringing discredit upon our army. As long as the Commander-in-Chief of the army, and the War Department are not on good terms, it is folly to hope for better discipline in the service. Instead of *increasing* the standing army the wiser plan would be to *decrease* it by getting rid of some of the inefficient officers. If Gen'l Miles is not capable of filling the high office which he holds, he should be promptly relieved of the responsibility, but if he continues as commander, then he should receive the hearty aid and support of the War Department, and those under him in authority should be taught the duty of subordination to a superior officer. If Alger is at fault, as many allege, then his place should be given to one more competent. As for Eagen, Chief of the Commissary Department, the universal opinion is that, no matter what might have been the shortcomings of Alger and Miles, his conduct is ungentlemanly and inexcusable and the court martial, ordered by President McKinley, was the only course Eagen has been "his own worst enemy." By his attack on Gen'l Miles, in language so gross as to demand revision before it would be received by the Army Investigating Commission, and his subse-

quent "crawfishing" from the same, he proved conclusively that he is unfit to hold any position of responsibility. If his charges were not true, he never should have made them; if true, he should have "stuck to them." As the *N. Y. Journal* remarks, "Eagen is of no importance in himself, but he is of immense importance as a symptom. He exhibits the appalling, unspeakable rottenness of our army organization." Congress should take such steps as would prevent in future the disgraceful bickerings among the war officials that at present makes our standing army the laughing-stock of Europe.

"Harnessing The Nile." The leading article in the *February Century* is an account, by Frederick Courtland Penfield, of a proposed dam across the river Nile in Egypt, for the purpose of giving water to the Nubian Desert. The Pyramids of Egypt, the monuments of the engineering and mechanical skill of other ages, will have a rival in the stupendous project now proposed, that of creating in "the heart of an African desert a lake having from two to three times the superficial area of Lake Geneva in Switzerland." The dam, which is to be built across the Nile at Assuan, is to be seventy-six feet high in places and nearly a mile and a quarter long; the top of the structure will be from thirty to forty feet wide giving bridge facilities, and in the reservoir, it is claimed, two hundred and fifty billion gallons of water can be stored. As it will be impossible to hold the Nile in check during flood-time, the dam must be so arranged as to allow the water to run through it several months of the year. It is therefore planned to divide the structure into a number of piers, with openings which can be closed by gates.

The contractors who are to undertake this great project are to receive \$800,000 a year for thirty years from the Egyptian government, and so confident are they that the dam can be successfully built, that they have agreed to wait until the work is completed and accepted before receiving their first payment. The author of the article says: "As an object lesson, this Egyptian enterprise should have no more interested observers than in America, especially in Colorado, Nevada, California

and other states of the West, where the irrigation expert is succeeding the railway-builder as a developer." This is indeed true, and if the government of Egypt can afford to go to the expense of constructing a work of such magnitude cannot this country, at a cost that is trifling in comparison, build reservoirs and dams, which will reclaim her desert wastes?

The Commerce of 1898. The story of the foreign commerce of 1898 is now complete.

Its exports are the largest in our history, its imports the smallest since 1885, although the consuming population is now 33 per cent. greater than at that time. And as if to emphasize the great work of this greatest year the month of December made for itself the highest record of exports ever made by any month in our history. The total exports of December were \$137,647,448 and of the full calendar year \$1,254,925,169. More than \$850,000,000 worth of the year's exports were the products of the farm—breadstuffs, cotton, provisions live animals, tobacco and fruit, given in the order of their value. Great Britain was the largest foreign customer.

Colonial Possessions. "The Colonies Protectorates, and Dependencies of the World, their Area, Population, Revenues and Commerce, and the Share of the Mother Country in their Commerce" is the title of a publication just issued by the Treasury Bureau of Statistics. Through the courtesy of A. P. Austin, Chief of the Bureau, we are able to give the following facts regarding it:

The colonies, protectorates and dependencies of the world number 126. They occupy two-fifths of the land surface of the globe and their population is one-third of the entire people of the earth. Their total imports average \$1,500,000,000 worth of goods annually, and of this vast sum more than 40 per cent. is purchased from the mother country. Of their exports, which considerably exceed their imports, 40 per cent. goes to the mother country.

Commerce between the successful colonies and their mother countries is in nearly all cases placed upon practically the same basis as that with other countries, goods from the home countries receiving in the vast majority of cases no advantages over those from other countries in import duties and other exactions of this character. In the more prosperous and progressive colonies the percentage of importations from the mother countries grows somewhat less as the business and prosperity increase.

Large sums are annually expended in the construction of roads, canals, railways, telegraph, postal service, etc., but in most cases the present annual expenditures are produced by local revenues or are represented by local obligations.

Great Britain owns two-fifths of the 126 colonies, protectorates, dependencies and "spheres of influence" or 11,290,412 miles of colonial territory, while the United States will own (if the treaty now pending is ratified) 168,287 square miles.

THE IRRIGATION PROBLEMS AND POSSIBILITIES OF NORTHERN WYOMING.

SOME OF THE AGRICULTURAL PROBLEMS AND POSSIBILITIES OF NORTHERN WYOMING— IMPRESSIONS OF A CAMPING TRIP.

BY PROF. ELWOOD MEAD.

(Concluded.)

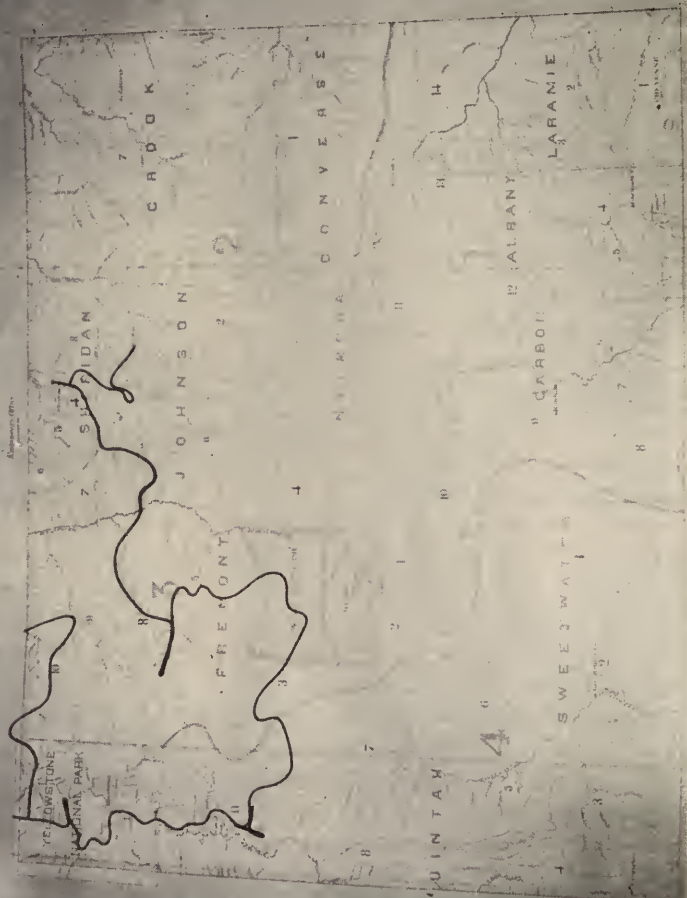
IRRIGATION ALONG THE GREY BULL RIVER.

After crossing the Big Horn river we passed through fifteen miles of a section that is doomed to perpetual aridity before we reached the Grey Bull river which it was our purpose to ascend. We spent an entire week in this valley in part because there was much to study and in part because the hospitality of the settlers made our stay exceedingly pleasant.

The progress of irrigation in this valley has a special interest because it affords an answer to a question often asked—whether or not farming can be made a success in sections of the state remote from railways and where there is no local market for farm products. It is a hundred miles to a railroad station from the nearest point in this valley and a mountain range has to be crossed to reach it. The growing of farm products for shipment outside cannot, therefore, be conducted with profit and the prediction has been made every year since settlement began that it would only require another season or two until the surplus would become so great that farm products would have no value. Thus far these forbodings have not been realized as the demand has continued to grow more rapidly than the supply and the price of oats along this river has averaged higher than in Chicago.

From the mouth of the river to the head of the highest ditch is 86 miles and it is 14 miles farther to the end of irrigation on Wood river, the principal tributary. The irrigable lands are confined to the valleys of the stream which are bordered on both sides by high and broken bad land ridges across which it is impossible to build ditches and whose surface is too broken to permit of the distribution of water. Wherever these ridges approach the stream the extent of irrigation is restricted and where they recede it is increased, but the bottoms which can be watered are continuous, varying in width from a few

Drainage Map
of
WYOMING



hundred feet at the upper end to nearly seven miles at Otto, and ranging in elevation from 3,900 feet at the mouth of the stream to 8,000 at the upper end. The principal town is Otto. When I first visited it in 1892 there was one irrigation ditch adjoining the town and a few land filings had been made on the lower bottom along the stream, but in traveling up stream 15 miles I did not see an acre of irrigated land. Since that time permits have been issued for 88 ditches from the Grey Bull and 19 from Wood river and the unimproved and unoccupied land through which I journeyed in 1892 is now all fenced and in process of improvement, although not ten per cent. of land under ditches already built is being irrigated. The best improved ranches are near the foot-hills. These were first taken up because the outside range rendered this region attractive to the early range stockmen. One of these gentlemen, Mr. Otto Franc, has over one thousand acres under irrigation, and his ditches, ranch buildings and other improvements are of the most substantial character. He is engaged in an improvement of so novel a character as to make it worthy of mention. He raises nothing but native hay and while these meadows were well adapted in their natural condition to the distribution of the water he is endeavoring to bring their surface to a slope of mathematical uniformity so the water turned out of the ditches will practically distribute itself over them. The cost of this improvement it is estimated will exceed \$40,000. There is now about 100,000 acres of land susceptible of irrigation from this stream. Of this 28,000 has been segregated under the Carey Act and nearly all of the remainder filed on under the United States Land Laws. About half of it is below ditches already completed. The cultivation of all this land would more than double the agricultural productions of the northern half of this state and the question of what use could be made of it is of considerable importance. In my judgment the solution is to be found in a closer union of the grazing and irrigable lands than has heretofore been possible. The Big Horn Basin is as large as Massachusetts. Thousands of cattle and sheep feed on the open range and a great many of them die in winter from cold and starvation because of lack of feed for this period. This ought not to be permitted and the remedy is to be found in the increase in the acreage irrigated, by which all range stock can be fed during this season. I know of no reason why sheep cannot be fattened with as much success and profit at Otto as at Ft. Collins, Colorado, or North Platte, Nebraska, where this business has proved the most remunerative use which can be made of both high priced land and costly water rights. Thus far agricultural production is far behind the demand. Much of the time while in this valley we could not purchase oats at any price. What we did secure we paid \$2.00 a hundred for. All the flour we bought came from Montana. So did the butter and eggs.

Some fears have been expressed that the water supply will prove inadequate. In 1897, the river was dry near its mouth the last of August. I do not share this fear. Enough water runs to waste in June to irrigate all the land in the valley for the entire year. The seepage water from the small area now under irrigation is largely absorbed in moistening the unirrigated land that surrounds it. If all of the land under ditches was irrigated the subsoil would soon be saturated and the water and seepage from irrigation in May and June would find its way back to the stream and be sufficient to meet the demand in July and August. As it is, wherever irrigated fields adjoin the river springs have appeared along the banks below. In a long and narrow valley like this it is possible for the same water to be used three or four times during a single season. I believe, therefore, that an abundance of water is not to be secured by restricting the irrigated area, but by arranging to use as much water as possible during May, June and the early part of July, and that when this is done there will be less danger of a shortage than there is under present conditions.

IRRIGABLE LANDS ALONG WIND RIVER.

After leaving Meeteetse we traveled south for fifty miles over a country having little or no agricultural future. The country is broken, the valleys are narrow and none of the streams crossed, except Owl Creek, have a perennial flow. At this point we climbed the Owl Creek range which divides the Big Horn Basin from the valley of Wood river. It requires a day and a half to reach Wind river at Crow Heart Butte, the place where we first caught sight of it, and it is difficult to imagine a more absolutely arid and worthless country than we crossed during this time. Nor were the spirits of our party improved by the knowledge that we were in the immediate proximity of an organized band of thieves, known as the Hole-in-the-Wall gang, which had been engaged in stealing horses, holding up stage coaches and robbing the mails of that section. The prospect of losing our horses and having to foot it out of a country so remote and desolate was not reassuring. Fortunately no such ill luck befell us.

We were now in the Shoshone Indian Reservation and away from all settlements. We saw a few deserted log houses and crooked and dilapidated fences which indicated that some of the Indians had been allotted lands in severalty, but there was nothing to show that they had made any progress as irrigators.

Wind river is a beautiful stream. We crossed it about the lowest point in the year, yet its discharge was 1,500 cubic feet a second and fording it was something of an adventure. On the north side the bad lands and high bluffs will always prevent any important agricultural development, but along the lower half of the river broad and extensive areas can be brought under cultivation by the construction of

large canals. Above Bull Lake, which is taken as the dividing point between the upper and lower valleys, comparatively little land can be watered from the main stream on the south side, but there are extensive and gently sloping table lands bordering the mountains which appear well adapted to irrigation and which are crossed by numerous tributaries which rise in the most elevated portion of the Wind River range and will furnish an ample supply for their complete reclamation. Time did not permit of an examination of these streams to determine what ditches out of them would cost but from the distant view which we had it seemed that their reclamation would be comparatively inexpensive.

West of the reservation the valley is from 6,500 to 8,000 feet above sea level and only hay and the hardier crops can be grown. All of the irrigable land has been filed on by stockmen and the greater part of the land brought under irrigation for the production of native hay.

WIND RIVER MOUNTAINS.

From Wind River to Jackson post office is 80 miles. We travelled the entire distance through a wild, mountainous region made historic by the adventures of the early fur traders and explorers. From Union Pass we looked out on a magnificent mountain panorama. Majestic snow-covered peaks rose on every side. The lofty spire of the Grand Teton rose above the clouds and although sixty miles away was a sight never to be forgotten.

The most interesting sight to the irrigators in the party was the streams which coursed their several ways in the canons below. We were on the crest of the continent and could take in at one sweep the headwaters of all the great rivers of the arid region which rise around Mt. Union and end in the Gulf of Mexico, Gulf of California and Pacific ocean.

From Union Pass we travelled twelve miles along the path of a tremendous ice field which in ages past plowed its way across the summit of the Wind River range. The miseries of that ride will not soon be forgotten. The trail was paved with round boulders ranging from the size of an orange to a beer barrel, and as our wagons bumped and slid off their rounded sides the spokes in wheels gave way, the seats on which we sat collapsed, and we camped that night a sea-sick, demoralized crowd.

On our way down the Gros Ventre river we saw evidence of considerable prospecting for placer gold and just below the mouth of Bacon creek came on some miners at work. Although their sluices were small they claimed to be making \$15.00 a day and had no desire to exchange for the Klondike.

JACKSON HOLE.

Our first view of this valley was from the summit of the ridge which forms its eastern boundary. I do not think Wyoming affords a



MEAD LAKE—RESERVOIR SITE, BIG HORN MOUNTAINS.

lovelier prospect than the one spread out below and before us. The valley is about forty miles long and from five to fifteen miles wide. It was formerly all under water but the frowning walls of Snake River canon show it has been drained. At the north end Jackson Lake, twelve miles long and three miles wide, skirts the base of the Teton range which is the most impressive collection of lofty peaks and precipitous canons I have ever seen.

It is a misfortune that a region possessed of such attractions should be so cut off from the rest of the world. There are places in the state which can be left to solitude without loss to anyone, but a region which lies within a day's drive of Yellowstone Park and whose lakes and mountains are destined to make it one of the show places of the globe ought to be filled with settlers. The few who have crossed the barriers are pleased with their new home and all who have worked are prosperous. The elevation, 6,000 to 6,500 feet above sea level, will always prevent the growth of certain crops, but the hardier grains and vegetables can be cultivated.

In reply to my inquiries regarding this Mr. Robert E. Miller, one of the earliest settlers and most prosperous ranchmen in the valley, furnished me the following statement of its products and possibilities:

The crops in this valley are principally hay—native, red top, timothy and alfalfa.

Potatoes are not a sure crop.

Rutabagas, turnips, carrots, parsnips and cabbage are sure crops—cannot estimate the yield per acre of vegetables for lack of experience.

Hay of all kinds can be raised successfully, averaging from one to two and a half tons per acre, owing to kind, season and attention.

The future of our valley as a farming country is doubtful, as it has frosts every month in the year.

This valley is naturally adapted to cattle raising, being entirely surrounded by high ranges of mountains that cut us off from all outside ranges. The low lands are limited, our winters are long, requiring that all animals must be fed from ninety to one hundred and twenty days each year.

Then, with an unlimited summer range in comparison to the amount of low land upon which must be raised the feed for winter, this valley raises Wyoming's best cattle.

The winters are severe. The snow fall is from two to four feet in depth and as there is little wind it covers the grass and feed must be provided for all live stock from December to April. The open range industry as practiced elsewhere in the state is out of the question here. Cattle are principally fed on native hay and the ease and cheapness with which ditches can be built makes its production a simple and inexpensive matter. I am confident, however, that the future will see greater diversity of products than now is thought possible. There is every reason to believe that winter wheat will do well. I saw some at Mr. Miller's of excellent quality. All kinds of

small grain are grown in Star Valley, fifty miles further south but at about the same elevation and with similar surroundings. At present the object of all farmers is to raise cattle to eat the free grass. It is the easiest and most profitable form of agriculture which can be followed and so long as this continues to be true other kinds of farming will be neglected. If, however, oats can be grown at all, there is not a place on this continent where the crop will be more profitable. From the time our party left the Grey Bull river until we reached the Yellowstone Park we were unable to buy, beg or steal a pound of grain to feed our teams. We were so greatly in need of it when we reached this valley that price would have been no object. It is already a great resort for hunters and in time will be for tourists. To care for them properly, food for teams is as necessary as food for men and the farmer who will provide for meeting this demand has a bonanza.

We had for our first supper a six pound trout caught in a brook in Mr. Miller's meadow. Later on we had elk steaks as a part of our regular bill of fare. On every side we saw evidence of the fact that we were in what was once the greatest home of large wild game on this continent. It was just at the close of the haying season and the immense stacks of hay were everywhere being surrounded by two parallel fences each about eight feet high and the same distance apart. It was explained that these were necessary in order to keep elk from destroying these stacks in winter. A single fence would not suffice, but if they jumped one they would land between the two and be unable to escape. The necessity for this protection had been abundantly manifested the winter previous. It had been of unusual severity and thousands of these animals had been forced by starvation into the settlers' fields and corrals. In order to save enough for their cattle the settlers had to guard their hay stacks day and night. The elk which starved to death inside settlers' meadows were numbered by thousands. We saw hundreds of skeletons which attested the truth of this statement, and were told by one gentleman that he could take us to a point at which within a radius of fifty feet a hundred skeletons could be counted. We were shown the hide of a moose shot within a hundred feet of a settler's door. Notwithstanding the immense number of these animals which now exist it was the conviction of all our party that unless some measures are taken to protect them from the wanton slaughter which is now going on, the day of their absolute extinction is near at hand. As we left the valley on the first of September, the first day of the hunting period, we met nineteen hunting parties in a half day. There ought to be some place on this continent where large wild game will be preserved so that future generations may know something of the primitive life of this region. Nothing would be more to the future advantage of this state

than to have such action taken at this time as would secure that preserve within its borders. The time is surely coming when an elk will be as great a curiosity as a buffalo now is and the opportunity to see them in their native wilds considered worthy a journey across the continent. It is my belief that all of the mountain country extending from the summit of the Wind River range to the eastern base of the valley in Jackson's Hole ought to be set apart at an early date as a National Game Preserve and all hunting within its limits absolutely prohibited.



GARDEN IRRIGATION IN KANSAS.

BY HON. EDWIN TAYLOR, Edwardsville, Kan.

Read before the meeting of the Kansas State Horticultural Society at Topeka, Dec. 27, 1898.

It may be set down as established that under usual Kansas conditions it will not pay to expend artificial water upon grain crops or grass. Wherever grain or grass can be produced profitably by irrigation it must be the case that water is easy to get, or that labor is cheap, or that products are dear. Kansas has no mountain streams like Colorado or California, neither is it graded by nature with that two-way slope requisite for applying such streams to crops. In our State water in most instances has to be elevated by machinery from river-beds, from wells or from artificial ponds. The initial cost of water thus produced, varying in its expensiveness according to the height and other incidents of its elevation always reaches a point where corn at twenty-five cents and wheat at fifty cents will not pay the bill. In India and Egypt, grain is economically produced where water is dipped upon it by hand or pumped up with rude buffalo-propelled tread mills. But the labor cost per man, per day, in those countries is in round numbers only one tenth as much as we must pay.

Four years ago the Legislature was overrun with people who seemed positive that Western Kansas would be taken by the bow-wows unless those animals were fenced out by ditch water. And it appropriated \$30,000.00 to be expended by a commission for the purpose of ascertaining the truth of that matter. The report of that Commission convinced the Legislature: First, that there are no bow-wows in Western Kansas: and second, that if there are they can be guarded against easier and better with the nutritious herbage of the plains supplemented by sorghum, Kaffir, corn and alfalfa than by any system of public works whatever. But it was worth all it cost, for the future tranquility of that section to have shown up the unreality of an irrigation mirage which included within its misty illusions alluring but deceptive appearances of practicability in all branches of Agriculture. The mistake which the Legislature made was that having satisfied itself about the futility of forcing grain and forage in the short grass end of the State, it did not then continue its investigations by spending \$30,000.00 to determine to what extent and under what circumstances the gardens and orchards of the east end of the State may be irrigated with profit. I particularize the east end because in a country where its horticultural products only can be irrigated nothing can be more obvious than that the place to begin ex-

perimenting upon such garden irrigation is the place where the gardens and orchards are the largest and the "mostest" and the water most plentiful and the "lift" the least.

I count that a garden where any fruit, but orchard fruits, and any vegetables are raised, whether the extent of the culture is measured by the size of a cotter's onion-bed or the hundred acre field of some potato man or cabbage grower. But when it comes to applying water to such cultures it makes an enormous difference in proportional expense, whether our estimate is based on a small tract or a large one. In fact the expense of planting and cultivating a kitchen garden is so much greater *per capita* (cabbage "Capita," for instance) than a market garden that not half our Kansas farmers within the rain belt ever feel able to afford the luxury of plentiful supplies of vegetables and fruits for their own families. It is not that the farmers of Kansas are more indifferent to the flavor of garden "sass" than their fellow craftsmen of other states, but that from one end of the country to the other the table of the average farmer is conspicuously less furnished forth with fruits and vegetables than the table of the average townsman. This is so because it costs the farmer more to raise his vegetables than it costs the townsman to buy them.

If now to the excessive cost of diminutive cultivation be added the proportionately excessive cost of diminutive irrigation the combined expenditure reaches proportions that most farmers will not stand. It remains that excepting among people who put a value upon Nature's beauties not measured in current funds, irrigation in horticulture will be confined to those gardens where stuff is raised to sell. Irrigation, if left to itself, will begin where the conditions as to soil, climate, water, transportation and markets are the most favorable and will thence spread through increasing difficulties to the limit beyond which it will not pay as a business venture. But when once the methods of applying water are generally understood, and the difficulties in the way of elevating it are worked out and familiarized and we come to appreciate the prodigious increase in yield and certainty when drouth is eliminated and the scorching, unclouded sun is converted into an adjunct of growth—when all these are accomplished—thousands who are not exacting as to the outlay for the gustatory, arboreal, or floral embellishment of their homes will continue the work begun for profit and carry it on as a labor of love and adornment till Kansas shall blossom like the rose. The argument in favor of irrigation for gardens rests at last upon the fact that fruits and vegetables are mostly water. Potatoes are 70 to 80 per cent water; strawberries 85 per cent water; turnips 90 per cent; apples 84 per cent; peaches 84 per cent; and water-melons something over 100 per cent water. There is no kind of culture that can compare with horticulture in this particular of appropriating water except cow culture. Milk is also mainly

water, but wet as milk is it contains more dry matter than an equal weight of plums, gooseberries or turnips. And there is this difference between milk and fruits: the more water milk has in it the poorer the milk is; the more water you can get into fruits the *better* they are. Nobody wants a dry apple, for instance, however fond they may be of *dried* apples. Some people have turned up the nose at the Ben Davis even on the ground that it was dry and punky. The more water you can get into fruit the better color it will have, while the more you put into milk the worse it will appear. With fruits the first point of excellence is juiciness—that is you want your fruit gorged with water. We say of such fruits, they melt in your mouth. In fact no fruit but watery, juicy fruit makes your mouth water. Then again there is no draft on the fertility of the soil for the water that goes into your berries. For instance, a crate of fine, large, juicy strawberries does not take as much “strength,” as we gardeners say, out of the soil, as a crate of strawberries that are all skin and bones. It is mainly the skin and seeds of berries that cost. That is where the nitrogen, the phosphoric acid and potash are stored. And then consider the effect of the two on the market; seedy berries soon satisfy demand; big juicy berries create demand. Little nurly, prongy, ornery potatoes stop people from eating potatoes. Nothing hurts the peach market like cull peaches. When it comes to potatoes, it would seem at first thought that the rule as to water would fall down; but it don’t. The driest potato comes from the irrigated districts; and yet one of those Utah Rurals for all it cooks so mealy will have in it as much more water than one of our Kansas potatoes as it is bigger than our specimen. Potatoes have the faculty of discrimination; they will take up the right proportions of everything to make ’em taste good but salt, that has to be added.

Irrigation does much more than supply the needed moisture to plants. It fertilizes them as well. Take it one year with another it beats commercial fertilizers. It doesn’t take the place of barn-yard manure because it does nothing to supply fiber and humus to the soil. The essential elements of fertility, potash, phosphoric acid and nitrogen are now locked up in the soil in such abundance that the only concern the cultivator need to feel is how to unlock them. These elements are unlocked by moisture, heat and cultivation. Our summer season furnishes plenty of heat, we can supply the cultivation; if the one thing now lacking, moisture, be sufficiently furnished, the fertilizer man will place no mortgages on our fields for generations to come. A farmer’s dearest enemy is the agent, the tree agent, the book agent, the lightening rod agent, the insurance agent, the creamery construction agent, and the agent for chemical manures. I have observed that the farmer seems to cope with the agent fairly well till the latter begins to figure. As soon as he draws his note book and pencil the farm-

er begins to waver on both wings and in the center. The only defence is for the farmer to out-figure the agent. Let us figure; the essentials of fertility which I have named can be supplied from within the soil or from without: from within by heat, cultivation and moisture; from without by fertilizers. An acre of ground, where the fertilizer route is adopted should receive each season from a half ton to a ton and a half of fertilizer. It will cost \$30.00 to \$40.00 per ton. Suppose we use only one half ton of the cheaper grade \$15.00 at the factory; in seven years the cost of the fertilizer will be \$105.00 per acre—more than the value of land in most parts of Kansas. Better results with half the money in any of our river valleys can be produced with water; and leave on hand a water plant, fully paid for, not half worn out.

The commercial gardeners in Kansas are mostly on bottom land within easy reach of water, lying directly below them from ten to thirty feet away. All that is required for their irrigation is a perforated point, a practical pump, some pieces of pipe and plenty of power. Points are cheap; pipe is cheap; pumps are cheap; power is cheap. We have envied our sister states with their mountain system irrigation without reason. We can deliver water on our bottom gardens cheaper than many Californians or Coloradians get their water delivered at their flood gates. And in ten thousand locations in Kansas, outside of river bottoms, running water is at hand or artificial ponds are feasible.

The most extensive use of the point and pump for irrigation purposes, that I know of, is to be found in Muscalin Island, Iowa. Its advent, there, dates back about ten years, and its development has been continuous. There are now about thirty irrigation plants on the island. I am told that none have ever been abandoned. These people are north and east of us; they have less sun and wind to contend with than we do; they also have more rain-fall. They don't need irrigation as bad as we do. If their necessities are less than ours, their facilities are somewhat greater; they are only twenty feet from water, whereas on river-bottoms we are about thirty. They apply the water they pump in precisely the same manner that a Coloradian applies the water to his ditch.

One of the most extensive irrigators on the island is Mr. T. B. Holcomb, he has been irrigating for five years, he intends to put in a second outfit next spring; his present equipment is simple and inexpensive. It consists of four four-inch points driven equi-distant from each other and each five feet from a common center. Here they are all connected up and a rotary pump attached to the connection. The pump is run by a twenty horse-power portable engine. The cost outside of the engine was about \$500.00. The discharge is sufficient theoretically to give ten acres one inch of water in ten hours. This

plant, all portable but the points, is located on the highest ground in a forty acre corner of Mr. Holcomb's garden. The pump and engine could easily serve a second battery of points in another similar field, giving forty acres a wetting while the first is drying out and being cultivated. The water is carried from the pump in two ditches over this forty, running substantially parallel with each other, across the field. When I was there the crops were cabbage, the harvest of which had just been concluded, and tomatoes which had followed early peas. The rows of cabbage and tomatoes ran clear across the "forty" and intersected both ditches. The ditch banks were thrown up with lister and plow entirely. They required reconstruction previous to every application of water. The force required to operate the system was an engineer and a man and boy to handle the water. The mode of application, was to begin at the lower end of one of the ditches; there the ditch bank was opened for four rows on each side of the ditch and the water allowed to run sufficiently, when a sheet-iron dam was forced into the soft dirt of the ditch banks and four more openings, opposite the next four rows, were made in the ditch bank, and so on. In practice, six acres per day was all that such an outfit got over; at the following cost:

Coal.....	\$1.50
Engineer.....	1.50
Man.....	1.00
Boy.....	.50

Total.....\$4.50, or 75 cts. per acre.

The cabbage was irrigated three times; the peas twice, and the tomatoes twice. The yield of early cabbage was, last season, fourteen tons per acre. In the neighborhood of large towns, hydrant water has been used for hot beds and intensive gardening.

The new celery culture contemplates a perforated pipe for every row. I have seen it in far away Florida. Thirteen cars of celery were received by one Kansas City commission house in one week this fall and every stalk of that celery crossed Kansas the long way. It seems to me that celery ought to be headed off by us. Mr. J. H. Hale, the famous nurseryman, irrigates his nurseries and small fruit plantations in far away Connecticut on the Atlantic coast with all its fogs and drizzling rains and he says it pays. If it pays a gardener to irrigate there, where the moist breath of the ocean is in the air, what would it not do in a country like Kansas, where a summer sun and thirsty winds conspire together to dissipate the soil moisture.

Not only is ditch water in effect a manufactory of fertilizer, as it flows along, and a substitute for, if not an improvement upon, the early and the later rains, but it is also more nearly a specific for the diseases that threaten the welfare of garden and orchard growths

than all the nostrums that were ever unloaded upon the unwary horticulturist. Nature abhors a weakling in the plant world. Once let the development of a plant suffer from lack of cultivation or nourishment or moisture or from wounds or other causes and you will find Nature loosing upon it all the troop of plant-woes locked up in that Pandora-box of hers. If there is a feeble tree in the orchard *that* is the one sure to be infested by borers, both round and flat-headed, the coddling-moths, the gougers and curculio, the bacteria, and fungi and microbes and woolly-aphis and straight-haired aphis and myriads of spores and various other things. For fortifying against this swarm the application of water is cheaper and better than "powder-guns" or pomological vermifuge—cheaper because in thousands of Kansas gardens, it will cost less to apply, and then being applied is also the most efficacious. It is efficacious because water is life; and whenever the life of the tree or plant is kept unchecked and bounding from start to finish, there is no foothold for enemies of the plant. It is not an unusual feature of fertilizer advertising to urge the prospective user of the same to give his crop, where the fertilizer is applied, double the usual cultivation. Nothing is said about double the usual cultivation where the fertilizer is not applied. But when you irrigate, you've got to give more than ordinary cultivation to keep the soil from baking; that extra tillage must be given also at a time when the ground is in that condition of moisture when cultivation seems to do so much good. Many of us need a spur to get a proper movement on our cultivators and tools. Nothing insures action in this regard with the horticulturist more certainly than garden irrigation.

Finally, brethren, I suggest that most of us keep our buildings insured against fire which seldom comes more than once or twice in a life-time, to most men never; others of us are insured against accidents, which hardly ever come to our assistance after we've arranged for a hundred dollars a week while the hurt lasts; still others have our lives insured, a doubtful sort of investment, wherein we have but one solitary chance, and it postponed to the very end of our careers, to win back our purchase money. But when it comes to insuring our garden crops against disaster by the application of water, there is no part of America, not the most favorable, where you couldn't get some returns from our irrigation insurance, and in half the summers there are dry spells that cause many of us more loss in three or four rainless weeks than we have lost by fire in twenty years.

J. Max Clark told me once that though he was sent by the Greeley Colony to Europe to study Italian and the system of irrigation, yet the conditions in Colorado were so different from any he found abroad that they had to develop plans of their own. It will be so with us. And if I have not been able to give you such definite information on this subject as I desired, I am confronted by the reflection that what-

ever we do in this way in Kansas, must be done tentatively and proceed slowly as we learn how. That cremona-loving residenter of Arkansas freely acknowledged to the fiddling traveler that he realized the porous condition of his roof, but he plead in extenuation of his neglect that in dry weather the necessity for repairs was gone, while in wet weather the *ability* to repair was lacking. Has it not been somewhat so with us? When we have had rain in plenty, water to burn, as we might say, we have felt independent of artificial moisture; and then afterwards when the plants "drooped and died in the stillness of noon" it was plainly too late to save *that* crop; and so we have allowed one precarious season after another "to slip into the silent hollows of the past" without any other effort than that which is found in draining, to avail ourselves of the way out, to which in many cases we have only thirty feet to go.



ABOUT MILK RIVER VALLEY.

SUCCESSFUL CO-OPERATIVE IRRIGATION CANALS IN THE MILK RIVER VALLEY, MONT

BY W. M. WOOLDRIDGE, CHINOOK, MONT.

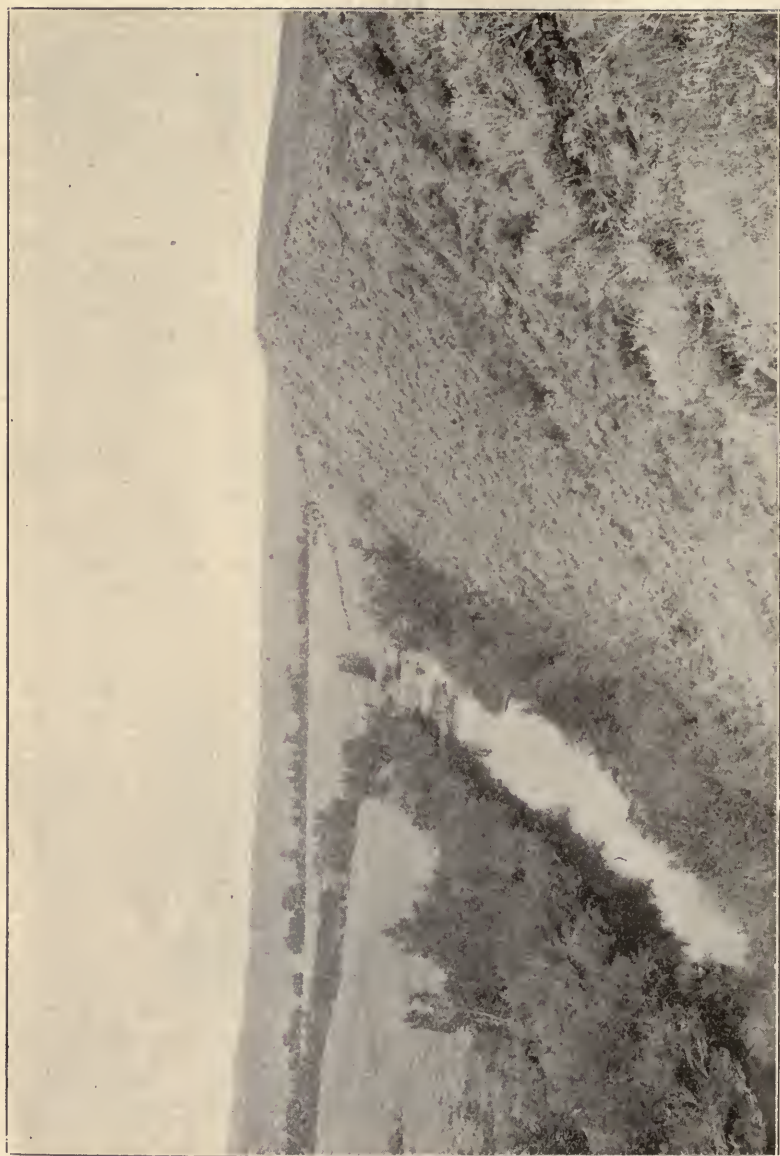
The first co-operative irrigation canal in this part of Montana was organized in 1897 by Mr. T. C. Burns, a former resident of the Gallatin Valley, Montana. For two years previous to that time Mr. Burns had been engaged in the construction of a canal to irrigate his own land, but at the earnest solicitation of his neighbors, concluded to make a co-operative stock company of it. A set of by-laws were drawn up, adopted articles of incorporation filed with the secretary of state, with Messrs. T. C. Burns, Thos. O'Hanlon, A. H. Reser, L. V. Bogy and W. M. Wooldridge as the incorporators.

The amount of water filed upon was ten thousand inches; the company was organized at ten thousand shares at a par value of two dollars per share. These shares were sold to the new stockholders in the denomination of one hundred each, which is usually spoken of as one share. This was deemed sufficient to irrigate 150 acres. These denominations were sold to the new stockholders for the par value of the stock. In this manner Mr. Burns was reimbursed for the work he had already done and all the members of the new organization were bound by our by-laws to assist in the completion of the new canal and to pay whatever cash assessment was necessary to complete the work. The work being the principal item of cost, the cash assessments proved comparatively light, averaging about one-fourth of the entire cost.

As soon as the organization was perfected, a competent civil engineer was employed to survey the proposed canal and to draw plans and specifications of the headgates, dams, flumes etc. A superintendent was also employed during the construction who had immediate charge of the work. During the second season some of the stockholders living near the head of the canal received water, and during the third, all.

The management is vested in a board of five trustees, elected annually from among the stockholders, one of whom acts as president of the board or company; the trustees appoint a secretary and treasurer. All officers except the secretary serve without pay, the secretary receiving a nominal salary, usually about one hundred dollars per year.

Under this system we have found it easily possible to reclaim



IN MILK RIVER VALLEY, MONTANA.

land at three dollars per acre, with a maintenance fee of only \$25 per year for each 160 acres. The Belknap canal—the first one organized—now has twenty-three miles of main canal, covers 16,000 acres of choice land and has been in full and successful operation for four years. Since its completion nine other companies have been organized on the same plan and the amount now invested in co-operative irrigation canals in this immediate vicinity is about \$200,000. With such a start your readers will readily see why this community is destined to become prosperous. One successful enterprise begets another. We have already learned the truth of the old adage, "in union there is strength" and are turning our attention to other matters.

This undertaking being the first of its kind it was considerably in the nature of an experiment, many mistakes were made, and the operations of the company were seriously hampered by poor and imperfect by-laws, but this was finally overcome and the company placed upon a firm financial basis. Subsequent organizations have profited by this experience. The stock of one of these co-operative irrigation canal companies is the best collateral that a person can offer a business man or bank in our community, it being accepted in reference to any other security.

In perusing the pages of the AGE have often wondered why such companies were not more general throughout the West. I have noticed in various sections, opportunities offered to investors in the matter of the construction of irrigation enterprises, where the settlers were already upon the ground, and the thought has occurred why these people themselves did not go ahead and complete the work. I have recently been making an extended investigation in the eastern part of this state. In many places I found splendid openings to put our theory in successful practice, and upon speaking to those concerned, found that it was little understood, but a little missionary work started them along. In many cases I found the number of settlers too limited to accomplish anything, and called the attention of the immigration agent of the railroad to the fact, so that it was assisted by more people being brought in. In nearly all such localities I have found the "leader" lacking. It requires some one person on the ground who has the faith of his convictions, who will take a personal interest in the company, who is a hustler and an enthusiast on the subject. On my trip, I found no less than seven communities that after a little effort seemed desirous to go ahead and accomplish something. I am confident that if I had the time and was to take a personal interest in these localities by placing two or more teams on the work to prove my confidence, that they could be successfully completed.

I have always been an advocate of the theory that those who own

the land should also own the water to irrigate the same and if this article will serve in any manner to further carry out that idea I will be amply repaid.

THE CALF PATH.

One day through the primeval wood
A calf walked home, as good calves should,
But made a trail all bent askew,
A crooked trail, as all calves do.
Since then two hundred years have fled,
And, I infer, the calf is dead,
But still he left behind his trail,
And thereby hangs a mortal tale.
The trail was taken up next day
By a lone dog that passed that way,
And then a wise bellwether sheep
Pursued the trail o'er vale and steep
And drew the flock behind him, too,
As good bellwethers always do,
And from that day, o'er hill and glade,
Through those old woods a path was made,
And many men wound in and out
And dodged and turned and bent about
And uttered words of righteous wrath
Because 'twas such a crooked path,
But still they followed—do not laugh—
The first migration of that calf
And through the winding woodway stalked
Because he wobbled when he walked.
This forest path became a lane
That bent and turned and turned again.
This crooked lane became a road
Where many a poor horse, with his load,
Toiled on beneath the burning sun
And traveled some three miles in one.
And thus a century and a half
They trod the footsteps of that calf.
The years passed on in swift fleet
The road became a village street,
And this, before men were aware,
A city's crowded thoroughfare,
And soon the central street was this
Of a renowned metropolis,
And men two centuries and a half
Trod in the footsteps of that calf.
Each day a hundred thousand rout
Followed the zigzag calf about,
And o'er his crooked journey went
The traffic of a continent.
A hundred thousand men were led
By one calf near three centuries dead.

—*Fact and Fiction.*

THE FARMERS' HOMESEEEKERS' LEAGUE.

“FREE HOMES FOR WILLING WORKERS.”

The object of this article is to extend a cordial invitation to homeseekers to join the “Farmers’ Homeseekers’ League” and by so doing gain all the advantages of mutual aid and concerted action. By the term “homeseekers” we mean those on the lookout for suitable locations for home-making along with land and conditions that will yield full returns for labor.

On the axiom that “union is strength” it is our aim to have our membership sufficiently large and powerful to insure the success of our movement to the fullest extent. The program of the League is to select for settlement one of the many hundreds of sites throughout the western states that are known to possess very fertile soil and natural facilities for raising bountiful crops thereon. Owing to reasons that we shall explain elsewhere these sections of land cannot well be settled on by people individually, as it requires the united effort of a number of men to create the improvements necessary to open up the land for profitable cultivation. Many of the tracts of land to which we allude have been acquired by land companies for the purposes of speculation and are being held at rates that put them practically out of the reach of the average homeseeker. Our intention is to avoid the necessity of having to go to these concerns by procuring the land direct from the government, which stands willing to make free grants to colonies and associations of men who undertake the work of reclamation. In this way our members will secure land for little more than the labor spent on the improvement, that had they bought from land companies might cost from \$25.00 to \$100.00 an acre. Information of several suitable locations is already at hand and other is expected, so that by the time the League has completed organization we shall have a good selection to choose from.

If you feel any interest in the movement and think it ought to be pushed along, join the League and help us to uphold the principles “*Free homes for willing workers*” so long as Uncle Sam

has vacant lands that he wants to get settlers onto. Do not let the rest of our unoccupied domain get into the hands of land grabbers but give them to those that need homes and are "choke-full-of-a-hard-day's-work" kind of people, that will make such land of real value to the nation. Get your friends and acquaintances also to take a hand in the good work, calling their attention to the fact that the issue we are fighting for is—Shall the valuable lands that still remain at the disposal of the government go to those who want them for speculation, or to those that will work and dig their living from them?

The League for several good reasons has decided to use the IRRIGATION AGE as the medium of communication between its member. The AGE is issued monthly and is devoted to the cause of colonization and the settlement of vacant lands. It is moreover the zealous advocate of and recognized authority on irrigation, the wonderful art that is destined at no distant day to increase many times the resources of this country.

Each issue of the IRRIGATION AGE will contain a faithful report of all the transactions of the League during the previous month along with all matters of interest to its members. There will be articles especially bearing on our project and the popular ownership of agricultural land as against landlordism. Every effort will be made to gather information respecting choice tracts of land for successful homeseeking and the result will be duly recorded in the AGE. All questions and answers from individual members will be duly attended to, thereby saving to the League for the present at least, the expense of a paid secretary. The IRRIGATION AGE has, in short, taken up a line of work of the greatest moment to the country and all such as come under the term homeseekers will find it simply invaluable.

The IRRIGATION AGE will be sent to our members for one year at the reduced price of 90 cents, postage prepaid. Send this amount in stamps or money order to the Editor IRRIGATION AGE,
916 West Harrison St., Chicago.

Further information may be obtained by addressing

I. HAMMOND, member F. H. League,
225 Dearborn St., Chicago.

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs, Also sketches or plans of convenient and commodious barns hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us improve the appearance of THE AGE?

GAS FROM MANURE

The *Literary Digest* (Jan. 21) contains a translation from a French paper upon the scientific use of farm refuse. It is claimed by a French scientist that manure could be put to a better use than that of a fertilizer, as the only elements which make it valuable for that purpose are found in such small quantities that in a ton of manure there is not more than a handful of the real fertilizing ingredients, such as potash, phosphoric acid and lime. The suggestion is made, therefore, that these fertilizing agents be used directly and the manure put to a more profitable use. The use suggested—that of lighting farm dwellings from the gases arising from manure—will be a new idea to many but this is what it is claimed can be done.

The director of the Pasteur Institute at Lille, France, Dr. Albert Calmette, has made experiments which have demonstrated that not only ammonia may be obtained from manure, but that the gases generated will burn in the open air. His method, as outlined in the magazine, is as follows:

"He advises covering the manure with a bell-shaped cover furnished with a tube that ends in a receiver filled with acidulated water. Thus, instead of dispersing through the atmosphere, the ammonia engendered by the fermentation of the manure would be collected in liquid form, from which the ammoniacal salts could easily be recovered. But this is only the smallest and the least interesting side of

the question. The fermentation produces not only ammonia, but also, in great quantities, carbonic acid, and divers gaseous hydro-carbons endowed with the precious property of burning in the open air with a bright flame." By furnishing the receiver with a good gasometer, Dr. Calmette claims enough gas can be obtained to light all the buildings of a farm.

There are establishments in England which now use city refuse to run the engines connected with the city electric plant. This refuse is burned in a special form of furnace and no other fuel is necessary.

While these suggestions are of no practical value to the average farmer at present, as it will doubtless be many years before we see farms equipped with an apparatus for making gas from manure, it is interesting to know what may be done in this line and in the future these possibilities may become practical realities.

A PLEA FOR THE POOR.

ANNA FORBES GOODYEAR.

While vast multitudes of poor people, in the United States, are suffering for products of land, millions of acres of government lands lie vacant and untilled. But want of a few hundred dollars to the family prevents the very poor availing themselves of them, under homestead laws; for means to get to them, cultivate them, and live while raising first crops are indispensable.

Since the needy of our land are estimated at millions, and all benevolent individuals

and societies together are doing but a very small fraction of what is required, both by charity and honesty, to supply this enormous demand for the barest necessities of life, it appears to be left for the United States government to do the great work of supplying, in such a way as to enable a large proportion of our poor to begin to become independent immediately, and to render all the rest who are able to work capable of undertaking private occupations, especially farming, within a few years.

Since life is necessarily dependent upon products of the soil, the right to life cannot be made good without them, or, in other words, comprehends a right to them, or to means of obtaining them by labor. The facts that, in past history, the powerful have succeeded in getting and keeping dominion over about all the earth's surface, to the deprivation of the weaker or less influential, and that the means of living and of getting livelihood are still withheld from a large proportion of the earth's inhabitants, by the rest of them, render governments now under obligation to act in a large way, and each see that its own poor have right—the means of independently living by their own exertions.

Present lack of capital results from deprivation of opportunity in the past, as does also ignorance of agriculture. Evidently also this same poverty has been a temptation to the greater evils of enervation, want of industry, and perhaps all forms of sin and suffering. Certain it is, that generally in civilized nations, the respectability of people is in proportion as they are well-to-do, or well off. Be it emphasized, this is speaking generally. But it is well known that the poorest classes are the more dangerous classes. The wealthiest streets in cities are the safest streets.

Thus it is seen that the United States government has before it, even more prominently and imperatively than it did have its lately accomplished glorious work for Cuba, the duty of enabling the great body of its own poor to obtain independently their own living, and gradually to rise to as high an elevation as any part of humanity should.

The method of this, it is thought, must be by teaching, in farming and in making by hand necessities, training and temporarily managing the able-bodied poor collectively upon large government farms, thus enabling them to earn independent capital, besides, if requisite, securing repayment, in work, of all expended by the government for them.

But, as soon as these ends are attained, it seems certainly advisable to let the laborers give their places to others, and go elsewhere for permanent settlement. There are a number of weighty arguments for this, particularly, for instance, separating the individual families of the lower classes from each other, for their own elevation. Undue contact of the superior poor with the degraded can be largely avoided by dividing them at the outset, and putting them on distinct farms.

The lack of the advantages of actually seeing the men settled in their own homes, as common in small colonies, can, by special arrangement, be made up for by trying, whenever expedient, to induce them to take land near the government plantation by aiding them and by exchanging products with them.

Friends of the work are needed to help choose localities, suppose of a township each, to aid in making minor details of plans, and to uphold it by their sympathy.

IN MONTEREY, MEXICO.

In a letter recently received from T. C. Nye, of Laredo, Texas, he spoke of a visit he made to the Hot Springs near Monterey, Mexico, from which we make the following extract:

"I saw fine irrigated land, water by natural gravitation; Mexicans plowing with a pair of oxen and using a crooked stick for a plow. On our hotel table there were absolutely no vegetables. The street cars of Topo Chico, [the springs] run through some fine irrigated lands which are given up to raising oats to be sold to the brewery at Monterey. It looked to me like a great waste of good land and pure water to be raising beer, while the city of Monterey, 73,000 population, had no vegetables. I had not seen Monterey for two years before, and thought the city

looked cleaner and brighter than before. I found that the cause for the improvement was that two weeks previous President Diaz paid a visit to Monterey, and sometime before Gov. Reyes of the state of Nueva Leon, of which Monterey is the capital city, issued an order to the effect that every house and fence must be painted in honor of the President's proposed visit. So it was done and done completely, even if the people had to borrow the where-with-all to do it with: Fancy such an order in the United States! * * * * All of the citizens of Monterey, regardless of nationality, take a two hours siesta after dinner and the consequence is that business is paralyzed for that length of time."

THE UBIQUITOUS BEET.

The beet sugar industry in the United States is now one of the recognized sources of revenue to the farmer, and the factories that are being erected to produce beet sugar attest the fact that the sugar beet is no longer a "fad" indulged in by a few experimentalists, but a moneymaking crop to the practical farmer. Indeed, so well satisfied have people become as to the possibilities of this crop that the experiment stations of almost every state have devoted considerable time and expense to the raising of the sugar beet and have embodied the results of their investigations in the bulletins which are sent out from time to time. So much has been accomplished in this way that there are few farmers now who are ignorant of the possibilities of this vegetable. Whether it pays to raise sugar beets depends almost entirely upon the proximity of the factory to which the product may be sold, as they can be raised in almost every state. As Mr. Herbert Myrick says in his book on "The American Sugar Industry," "No one state has a monopoly of the beet sugar industry. Some Nebraska farmers have an idea that the business will be confined to their state because it has two factories in successful operation." The fallacy of this idea is proved by reading the book.

Of an industry of such magnitude as this promises to be, it may be interesting to trace the growth from small begin-

nings. This, thanks to Mr. Myrick, we are able to do. It is only in very recent years that we have heard very much regarding the sugar beets in this country, and it will doubtless be news to many to learn that an attempt to produce sugar from beets was made as early as 1830. In that year the attempt was made at Philadelphia but was not a success. Eight years later, David L. Child, of Northampton, Mass., was more successful, obtaining 6 per cent of sugar from beets. Experiments were made with more or less favorable results in different sections of the country from that time on, and in 1863 the Gennert Brothers, Germans, started a sugar beet factory in Illinois, at Chatsworth. The location was against it, to begin with, and other disadvantages conspired to render the enterprise a failure. The plant was moved from Illinois to Wisconsin, from where, after another discouragement, it was taken to California.

The chief cause of the failures in the factories was due to the lack of interest on the part of the farmers; they did not realize the possibilities of the crop and so it was difficult for the factories to obtain beets and those that were produced were of an inferior quality.

From this era of discouragement was evolved the present great industry, which is increasing from year to year: and the history which Myrick gives is interesting to anyone and is not the least attractive feature of the work.

California was the first state in which a sugar beet factory met with success, and the pioneers in this line were E. H. Dyer and his son Edward, who were persistent in their efforts at Alvarado, where the first successful factory was established. It was years, however, before this success was attained. In 1880 the journal devoted to the beet sugar industry, known as *The Sugar Beet* was founded by Lewis Ware: an omen of the success of the vegetable, for when an enterprise has gained a sufficient foothold to warrant its having a journalistic "organ," it is in a fair way to succeed.

After tracing the failures and successes of the early pioneers, Mr. Myrick de-

scribes the sugar beet factories now in operation, with their managers, and illustrations of the more prominent ones—such as the factories at Lehi, Utah; Chino, Cal.; the Oregon factory, etc.—are given with both interior and exterior views.

"The American Sugar Industry" is just what its author claims it to be—"A practical manual for farmer, or manufacturer, capitalist or laborer, statesman or student," and an idea of what Mr. Myrick has embodied in the work may best be gained by giving the heads into which the contents are divided.

Part One takes up the "Economics of Domestic Sugar Production," and in three chapters discusses what the industry means to this country, the effect of the Dingley tariff, the progress of the past three years; the present outlook and the effect of "expansion" upon domestic sugar, etc.

Part Two is devoted to the consideration of the cane sugar industry; the area suitable to its production, the culture, harvesting, etc.

Part Three—"The Beet Sugar in America Prior to 1897"—is divided into four chapters, in which is told what has been accomplished in the United States, the growth of the industry in each state, and the commercial aspects of the industry.

Part Four tells of the progress made since 1896; the development east of the Mississippi, from the Mississippi to the mountains, and the best development on the Pacific coast; lessons to be learned from the past; mistakes to be avoided; and lastly the appendix, which in addition to its valuable reference tables and statistics, gives a list of places that want sugar factories.

This will give an idea of the contents of the book, which is handsomely illustrated and bound in cloth, the cover being especially unique and artistic.

IT PAYS TO BE CLEAN.

A model dairy farm is the one owned by H. B. Gurler, at DeKalb, Ill., and it is an interesting place to visit. The following extract shows how careful the proprietor

is to secure perfect cleanliness in the dairy:

"The 18 men who do the milking wash themselves and comb their hair before beginning their task, dress in clean white suits, milk into pails protected by strainers which prevent a particle of dirt from entering, and everything is of the most cleanly and sanitary nature. The cows are regularly inspected and subjected to tuberculin tests to insure perfect healthfulness. The milk is put up in bottles, the corks of which bear the date and hour of bottling."

Farmers and dairymen who are inclined to laugh at this as being too particular, should bear in mind that on account of its absolute purity the milk from this dairy is sold to Chicago hospitals for twelve cents a quart, thus giving Mr. Gurler a revenue of about \$100 a day.

Springville, Utah, is making a mighty effort to secure a beet sugar factory. It is claimed this is the best site in the state for the location of the factory, as it is in the center of a great sugar beet country. The manager and superintendent of the Lehi plant say if the citizens of Springville will donate a hundred acres of land, with water rights, they will build and equip a larger factory than that of Lehi.

"The extension of the Pecos Valley and Northwestern railway from Roswell, N. M., to Amarillo, Texas, is completed. The last rail was laid today," says the *Pecos Valley Argus*, Feb. 3. This connects the Pecos Valley with the eastern markets and gives cause for rejoicing in New Mexico. "The country tributary to the line from Amarillo to Pecos is the largest and best cattle-breeding section in the whole south-west," continues the *Argus*, and "with the new transportation facilities, the business of fattening cattle for the Kansas City and Chicago markets on the cheap food raised on the irrigated land in Pecos Valley or on the refuse from sugar factories will assume large proportions." We congratulate the Pecos Valley and vicinity upon the completion of this road, which means so much to her.

PULSE OF THE IRRIGATION INDUSTRY.

THE WORK OF THE YEAR.

Through the courtesy of W. A. Henry, Director of the Agricultural Experiment Station, University of Wisconsin, at Madison, we are in receipt of the fifteenth annual report of the station. It is a well gotten up volume and the reports contain valuable information for all interested in agriculture. The director's report shows a gratifying advancement in the work of the station, and increased interest in its work by farmers throughout the state is attested by the heavy correspondence and the large number of visitors. The new barn, erected during the past year is one of the many improvements made, and the director hopes during the coming year to receive a sufficient appropriation to make the remodeling of the dairy building possible. The new dairy barn is so well arranged and equipped that it may be taken as a model of its kind and at some future date we hope to give a detailed account of it. A few words will suffice at present. "The barn is a frame structure, consisting of the barn proper, 86 feet long by 50 feet wide, with two wings each 70 feet long, projecting at right angles from each end of the main building. A large class-room is conveniently located between the two wings." From this may be gained an idea of the dimensions of the building, the cost of which was \$16,000, with \$2,000 more for equipment. The illustration of the stalls and mangers, reminded me of nothing so much as a hospital ward, the stalls, constructed of gas pipe posts with framework of gates and panels of channel-iron supporting woven steel wire, corresponding to the rows of iron beds in a hospital. The students have every facility for studying dairying that the importance of the

dairy interest in the state warrants. Extensive experiments were made regarding milk and its products—cheese and butter. It was demonstrated that, contrary to the popular belief warm milk absorbs impurities even more readily than cold, which is an added reason why the cow stable should be kept clean. The results of the investigations in this line are very interesting.

Sugar beets received considerable attention at the station during the year, as the director has maintained for years that it was possible for this country to produce its own sugar.

The physicist, F. H. King, under the subject of the "Importance of the Right Amount and the Right Distribution of Water in Crop Production," says that the past year is the first since 1888 which has had sufficient rainfall, and so well distributed as to allow nearly maximum yields to be produced. From the first of April to the last of September there was but one interval of fifteen days when no rain fell. Despite the unusual amount of rain fall, irrigation was used, and was amply justified by the results. Three crops of hay were raised during the season; the third crop, which was harvested Oct. 5, was made possible by irrigation. Two crops could have been obtained without it. The first crop yielded over two tons per acre, the second crop over one ton per acre, and the third, 950 pounds per acre.

Experiments were, of course, made with other products. In the potato crop the yield from the irrigated plots showed a decided increase over those not irrigated, there being a mean difference of 8.65 per cent between the two.

These results, taken with those of 1896 and 1897, "appears to establish the fact,"

says Mr. King in conclusion, "that with potatoes, as with hay, the rainfall of Wisconsin is seldom so large in quantity or so well distributed but that good and timely irrigation will measurably increase the yield."

Mr. King also gave the results of his investigations with the windmill as a motive power, an accurate record being kept of the amount of water pumped each day from March 6, 1897, to March 6, 1898. The windmill used was a 16-ft. geared steel power mill, purchased of the Aeromotor Co., of Chicago, and the pumps used were: a reciprocating pump with 14-inch piston, one of the bucket kind, manufactured by Seaman & Schuske, of St. Louis, Mo.; a No. 2 Gould and a Menge pump. The Seaman pump was always given to the mill in light winds, as it required the least power to run it. Its normal capacity was 120 gallons per minute. From the accurate account kept of the work it was found that during the year the total amount of water pumped was 24,433 tanks, each tank holding 141.2 cubic feet; or expressed in another way, enough water was pumped during the year to cover 79.1 acres 12-inches deep or at the rate of 2.6 cubic inches per day for the entire year.

To use the windmill as a motive power for furnishing water for irrigating purposes, it is necessary, owing to the great variability of the wind velocity, to store some of the water pumped so that it may be used in times of insufficient wind, if needed.

Statistics concerning the windmill power with especial reference to irrigation give the following conclusions:

Irrigating once every ten days, lifting the water ten feet, it was found that the mean amount of water pumped during the 100 days from May 29 to Sept. 6, the season when irrigation is most needed in this country, was 24,549 acre-inches per 10 days. Expressed differently, 10 inches of water can be given to 24.5 acres of ground during 100 days where the lift is 10 feet.

THE ALKALI SOILS OF THE YELLOW-STONE VALLEY.

The evil done to the soil through over-irrigation is so widespread and so disastrous alike to the soil and to the irrigation industry, that anything tending to correct the tendency by pointing out to farmers the folly of the injurious use of water, is worthy of dissemination. We take pleasure in presenting a few extracts from a bulletin lately issued by Chief of Division of Soils, Milton Whitney, and Thos. H. Means:

"There is generally little system in the application of water to the land. Very few of the planters know how much they need. The water is applied when the surface appears dry, and it is then applied in such excess that much of it cannot evaporate. * * * * * Proper irrigation in an arid region furnishes an ideal condition of crop production. In practice, however, the method of applying water to the land is extremely crude, and there is really little cause to wonder that much harm has been done through over-irrigation"

The following is given as to the origin of the alkali salts:

"Any excessive accumulation of soluble mineral salts in the soil is popularly spoken of as "alkali" in the West. The term, therefore, as popularly used and as used in this bulletin, does not necessarily refer to material of an alkaline or basic nature. The alkali soils of the West are of two principal classes: The alkaline carbonates, or black alkali, usually sodium carbonate, is the worst form of alkali, actually dissolving the organic materials of the soil and corroding and killing the germinating seed or roots of plants; the white alkalis, the most common of which are sodium sulphate, sodium chloride, magnesium sulphate, magnesium chloride, and occasionally, as in northern Nevada, some of the borates, are not in themselves poisonous to plants, nor do they attack the substance of the plant roots, but are injurious when, owing to their presence in

excessive amounts, they prevent the plants from taking up their needed food and water supply."

* * * * *

"One of the most discouraging features of the whole problem is that the owner of a tract of land may use the most approved methods of irrigation, and yet be completely ruined by the excessive and injudicious use of water by his neighbor, who may himself escape the injurious effects of his own crude methods, at least many years after his neighbor has been ruined."

* * * * *

Summing up the investigations and conclusions of the authors we get the following:

"The results of these investigations show that the ultimate source of the alkali is in the sandstone, and particularly in the shale or slate rocks from which the soils have been derived. Before irrigation was introduced the salts were present in rather large amounts, but well distributed throughout the soil, and not in such large quantities as to be injurious to crops. The injury is due entirely to over-irrigation, to the translocation and local accumulation of salts by means of seepage waters, and to the imperfect drainage facilities in the compact gumbo soils and the inability of the soils to remove the excess of salts and of seepage waters. The first trouble appears to be due to the seepage waters. This, of course, need not necessarily be so, but it appears to be the case in this locality. The open sandy lands, having better underdrainage, are not likely to be injured by a rise of salts except from an excessive application of water or in the low places in the path of the drainage system, especially when these are underlaid, as they are liable to be, by the heavy gumbo subsoils. The gumbo soil requires great care in cultivation, as it is easily ruined by the accumulation of seepage waters and the subsequent accumulation of salts."

"Where the damage has been done, or where the conditions are so imminent that

ultimate ruin can be foreseen, the logical method of reclamation is in providing adequate systems of drainage to carry off the excess of water and the accumulated salts. This is expensive, but it is the only thing in this case to hasten the slow processes of nature, which are entirely inadequate in the presence of the present methods of irrigation and of culture. Underdrainage is expensive, but it has amply repaid for the investment in other localities where land is worth no more than in the Yellowstone Valley. Any land which is worth \$50 per acre could well afford to be taxed for underdrainage if it is necessary, as in many places in the Yellowstone Valley, to save the investment from utter annihilation."

"It must not be assumed, however, that a thorough system of underdrainage relieves one from exercising care and judgment in applying water to the land. There is less immediate danger of ruining the land, to be sure, but there are two things to be considered, namely, that an excessive use of water means just so much loss to irrigation and so much less land which can be brought under the ditch, and also that in the removal of these salts by the flow of the seepage waters out through the drainage system large quantities of really valuable plant food are likely to be removed from the soil. The very accumulation of these soluble salts is due to the arid conditions of the climate. The great fertility of the soils results from the accumulation of these salts, and if we introduce artificial drainage, which will tax the resources of the soil, we may remove in the course of a generation, or even in less time than this, the accumulated results of the changes of vast geologic ages in the disintegration of rocks. By over-irrigation and underdrainage we may remove in a few years the very conditions which contribute to the wealth of the country in the fertility of the soil."

"Great care must be taken in the application of water. As little as possible should be applied at each time, so that

there shall be as little waste as possible to go off as seepage water. The surface then should be thoroughly cultivated, unless otherwise protected from evaporation by alfalfa or other close-growing crops, so as to reduce the loss of water from the surface to a minimum and prevent thereby the accumulation of salts at the surface.

The rise in the level of water in the wells must be looked upon with uneasiness and guarded against with great care."

The Division of Soils has invented a device for determining the moisture content of soils through their electrical resistance. A cheap modification of it has been made, for use with irrigating plants, which will not cost over \$10, and as by this the farmer can gauge the water content near the surface or at any desired depth, and thus avoid undue accumulation of water in the sub-soil, it would seem well worth the price.

About the middle of January a meeting of the Farmer's Protective Association was held at Phoenix, Ariz., and a new organization formed, comprising the "original appropriators" of water in the Salt River Valley. The written articles of the association were signed by eighteen of the farmers present and the next step will be to file the articles with the county recorder, thus becoming a legal incorporation. The object of the association is to "defend, support, protect and mutually aid" each other in obtaining water for the purpose

of irrigating the individual lands of the members of the association. Only farmers and land owners of Salt River Valley may become members. Renters or owners of land in Manicopa county to which water was applied on or before 1880 are eligible. Similar organizations should be formed in other localities.

THE DAM AT EL PASO.

I. A. Barnes, El Paso, Texas, sends a clipping from a local paper with reference to the construction of the Elephant Butte Dam, which says:

"It is understood the Elephant Butte Dam company is making active preparations to resume work and is contracting for a considerable amount of foreign cement. This would indicate that the English company has reason to believe that the decision of the Supreme Court will be favorable to the company."

Mr. Barnes is of the opinion that the "International Dam" project has received a severe blow in the death of Minister Romero, as he was more familiar with the subject than it is likely his successor will be. Mr. Barnes' letter was not intended for publication, but we quote his closing words as they echo the sentiment of many irrigationists in other sections of the country besides El Paso: "I think the expansion of a lot of waste flood waters into a storage reservoir beats Philippine expansion all to thunder, and it would be a great deal more benefit to our own home agricultural interests."

WITH OUR EXCHANGES.

FORUM.

The current number of *The Forum* completes the twenty-sixth volume; and it may with propriety be said that the magazine, with increasing years, shows no sign of decadence, but, on the contrary, preserves its virility unimpaired. In the February issue there are two articles of especial importance at the present time. One is by Commander R. B. Bradford on "Coaling-Stations for the Navy." This officer, as is well known, has seen much active service, and in bringing the necessity of coaling-stations before the public his effort has been, as he says, to deal with facts. The other paper is by Hon. David J. Hill, Assistant Secretary of State, and is entitled "The War and the Extension of Civilization." But possibly the article which will most appeal to AGE readers is the one on "Good Roads and State Aid," by Otto Dorner, chairman of the National Committee for Highway Improvement of the L. A. W. The fact that an article of this character appears in such a leading publication is a gratifying indication of the progress the "good roads" movement is making.

"The last two generations" writes Mr. Dorner, "have seen a wonderful growth in transportation facilities. The opening up of new territory has continued to lend tempting opportunities to capital for railroad investments. * * * * *

The improvement of country roads—the principal arteries of commerce and travel—has not kept pace with the development of transportation facilities by rail and water. The country road seems to have been a stepchild of legislatures. Its construction and improvement have been left almost entirely in the hands of the farmer; and the rural district is not equal to the occasion. * * * * * 'Working out the road tax' is generally a farce. Our average country highways are little better today than they were at the close of the

Civil War. * * * * *

Sterling Elliot, editor of the *Good Roads Magazine*, once very aptly said, that before we could thoroughly realize the difficulty of hauling on our country roads, it would be necessary for one of two things to happen; either the horse must learn to talk, or else we must take his place on the wagon. The latter occurred, he said when we learned to ride the bicycle."

MCCLURE'S MAGAZINE.

Rudyard Kipling has written a poem entitled "The White Man's Burden," evidently called forth by the colonial development of the United States, which appears in the February issue of *McClure's Magazine*. The following are a few extracts from the poem which is written with Kipling's usual power of making scenes and people live before you. Who but Kipling could, in a single line, so well describe these half savage people?—"The silent, sullen people—half devil and half child."

Take up the White Man's burden—
Send forth the best ye breed—
Go, bind your sons to exile
To serve your captives' need;
To wait in heavy harness,
Our fluttered folk and wild—
Your new caught sullen peoples,
Half devil and half child.

* * * * *

Take up the White Man's burden—
The savage wars of peace—
Fill full the mouth of Famine,
And bid the sickness cease;

* * * * *

The ports ye shall not enter,
The road ye shall not tread,
Go, make them with your living
And mark them with your dead.

* * * * *

By all ye will or whisper,
By all ye leave or do,
The silent sullen peoples
Shall weigh your God and you.

It is claimed that the January number

of this popular magazine is out of print, with nearly 15,000 unsupplied subscribers, while their February edition is 70,000 copies larger than that of last year.

SCRIBNER'S.

A writer new to American magazine readers is William Charles Scully, who appears in the February *Scribner's* with a tale of South Africa entitled "The Lepers." Mr. Scully is a magistrate of Pondoland, whose work has attracted the favorable attention of Rudyard Kipling, who says of him, "He has been practically brought up among South African races, and has no small reputation of his own, as the author of 'Between Sea and Sand,' and several other books."

Joel Chandler Harris has created a new character, "Aunt Minervy Ann," who is destined to take a permanent place alongside of "Uncle Remus." The first story about her appears in the February number, with Frost's inimitable pictures.

Senator Hoar's article on "Four National Conventions," tells the story of how Blaine lost his chance of being nominated for the presidency and also defends Garfield from the charge of being untrue to the interests of John Sherman when he accepted the nomination for the presidency. Senator Hoar presided over the convention when Garfield accepted the nomination.

THE REVIEW OF REVIEWS FOR FEBRUARY.

"The Progress of the World," the editorial department of the *Review of Reviews*, deals this month with the new problems of colonial administration now confronting the country, with the senatorial campaigns in the different states, with the polygamy question, with the question of army beef in its bearings on the reorganization of the War Department, with our recent industrial progress, protective tariffs, and the "trusts," and with the month's developments in foreign politics.

The subject of the character sketch is Aguinaldo, the Filipino insurgent leader, and a very interesting career is outlined by one who has known the young leader intimately. Mr. Crittenden Marriott writes in defense of the Cuban character

and Mr. Henry Macfarland describes the admirable work of the Signal Corps in the war with Spain. An article advocating the federal taxation of interstate commerce is contributed by Prof. Henry C. Adams, Statistician of the Interstate Commerce Commission. An interesting study of the Dutch rule in Java is given by Sylvester Baxter.

A RANCH THAT PASTURES 120,000 CATTLE.

The X. I. T. ranch, in the extreme north-west corner of the Panhandle of Texas, the largest ranch in the world, has an area of five thousand square miles. Its herds of cattle aggregate 120,000 head, beside 1,500 horses, and the calf crop branded in 1897 exceeded 31,000. Surprising as it may seem, all the work on the ranch is done by 125 men, one man to every 24,000 acres.—February *Ladies' Home Journal*.

INDIAN ENGINEERING.

This journal, published by Pat Doyle, at Calcutta, India, is one of the recent additions to our exchange list, and is a very acceptable one indeed. It is issued weekly and gives the irrigation and engineering news of India and the east. In one of the recent numbers was a poem, "Died on the Line," by Rudyard Kipling, which was written expressly for this journal and appeared in the February issue, 1887, years before Kipling achieved his world-wide fame. It was reprinted in the December number this year, and the following verse will show what it is like:

"Their headlamps drove a nation's darkness back,

Their whistles bade a hundred hatreds cease—

Their engines thundered down the echoing track:—

'Prosperity and Peace.' "

Another issue contains an interesting account of the proposed Assuan dam across the river Nile.

ODDS AND ENDS.

A NEW COMPANY.

The readers of the AGE have become familiar with the advertisement of the Shuart grader, which appears regularly in our columns. This machine was originally devised by Mr. Shuart to meet his personal needs as an irrigator and alfalfa grower, on a large scale, in Montana. A few years since Mr. Shuart sold his ranch interests and removed to Oberlin, O., where he has since been engaged in the manufacture of his grader. The machine is now made in two styles, one of which is especially designed for leveling land for irrigation and the other, for the use of contractors for road and street purposes. For leveling land, it is far superior to any other device in use, and has had a wide sale throughout the irrigated west. A company, composed largely of Cleveland, O., capitalists and named the Shuart Grader Co., has recently been organized to manufacture this machine on a large scale at Oberlin, O.

ROOSEVELT'S OPEN DOOR POLICY.

One of the sensible things Gov. Roosevelt has done is to set apart a time for the reception of newspaper men when they will be given such news as is proper to publish. Nobody is barred for partisan reasons, and the governor proposes to use the press and the publicity it gives to current news of his administration as a help to a better understanding by the people of their state affairs. The example of the governor is a good one, and such frank dealing with the press indicates that he does not contemplate work as the people's servant which cannot stand the light.—*Sioux City Jour.*

NOW IS THE TIME.

Now is the time to order indexes and replenish the office with desks, chairs, cabinets and office necessities and the reference card index system, which the U. S. Desk, File & Cabinet Co., of Indianapolis, are originators of, and others imitate. If you have not purchased your supplies for your cabinet file, or want a new one, they only cost 50 cents per drawer complete with indexes. This offer is only for thirty days though. Indexes can be furnished from the Amberg, National Rival, Wabash & B. & B. cabinets at the low price of \$1.75 per dozen and cases at the same price per dozen. The inventor has been twenty years completing this series of indexes and he is confident they will be appreciated, both as to style and particularly price. Their factory is one of the best equipped in the United States and occupies more space than all the others put together for this branch of the business. They have been running day and night for the past two months and at the present time are thirty days behind with orders. As soon as the weather will permit they will erect a new building to accommodate their growing business. The entire force of employees from president to janitors live in homes owned by the company and their business is run somewhat on the co-operative plan and is done on the cash basis. Particulars and circulars can be had upon application.

A BRIGHT OUTLOOK.

Chicago capitalists recently paid \$3,000,000 for a controlling interest in the vast pure native soda deposits in Wyoming. These deposits are about fourteen miles from Laramie (Wyo.) and consist of three

dry lakes or beds containing supplies of practically pure sulphate of soda, the government analysis showing 44 parts of pure sulphate of soda, 54 parts water and 2 parts alien matter. The deposits are reached by a spur of the Union Pacific road. The chemical works now in operation can only supply 150 tons of the sulphate per day, but as the material is used in many of the industries and manufacturing the demand for it is so great that the company propose increasing the capacity of the plant to 1,200 tons daily.

The past year has proved to the satisfaction of the doubters that the canning factory at Austin, Texas, is a paying concern. It is claimed the factory can put up for market 15,000 cans per day of corn, tomatoes and similar products. The factory would have made more money the past year but for the fact that it was impossible to get the products, so many farmers insisting on raising cotton.

WE'LL BE GOOD.

Recently we received a copy of the *Grandfalls New Era* (Texas) with vicious-looking lead pencil stabs around an article to draw our attention to the fact that we had "done the editor wrong." Some publication had evidently copied from the *New Era* without giving proper credit, and the editor voiced his woes under the heading "Give the Devil his Due," in which he said:

"And now comes the January number of the IRRIGATION AGE of Chicago, who copies our article under the heading of a 'Good Suggestion' but credits it to 'Some One' who has been moved to write to the editor of the *New Era*.—Gee Whillikens as if the editor was not capable of making such a 'Good Suggestion.'

It is very true that our little 'Twofer' is not much of a paper but for this very reason we must insist that our friends

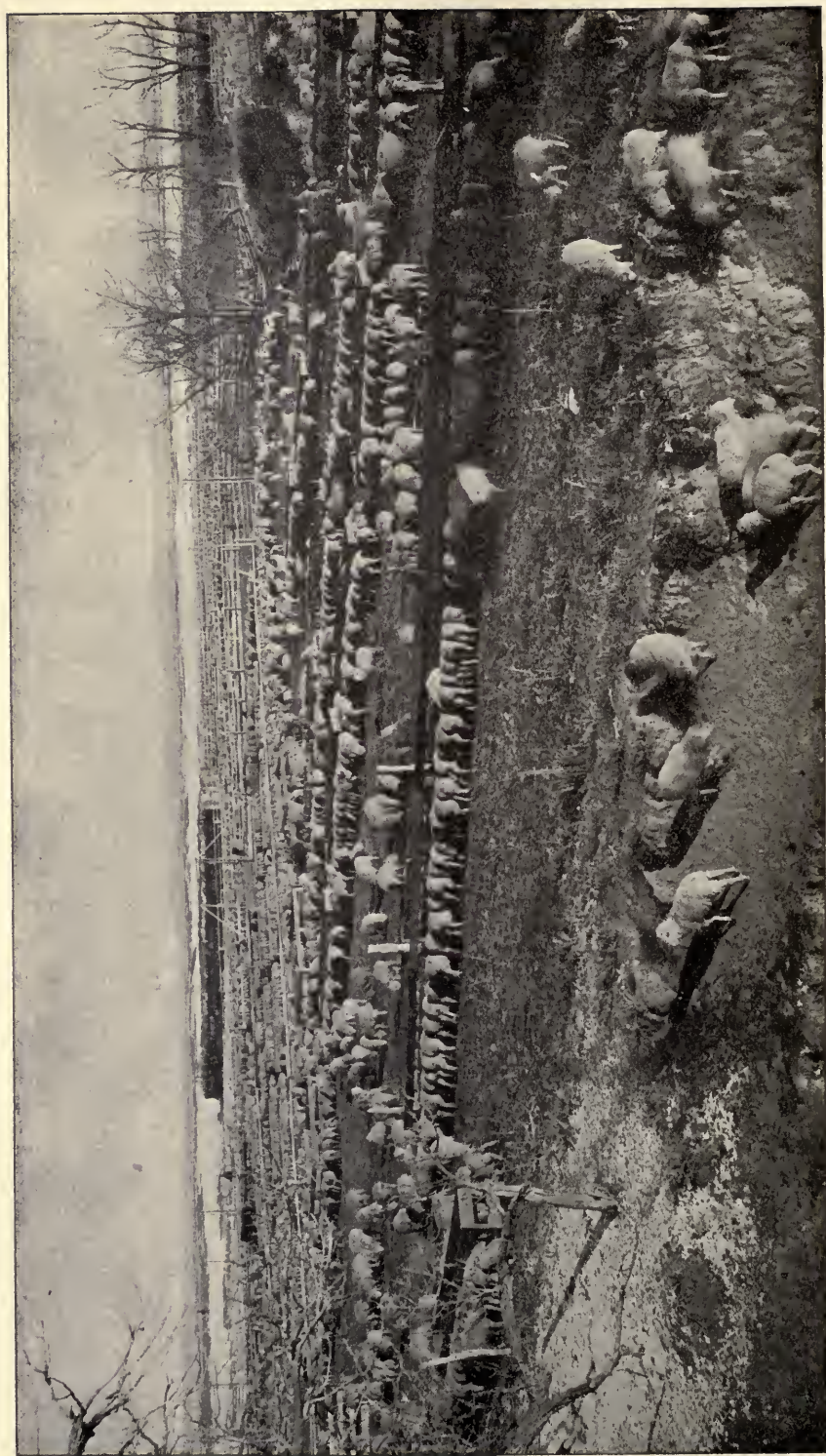
either let us severely alone, or give us credit for what we do."

We acknowledge the error of our ways and crave pardon. We thought the article was a communication from a subscriber, but we were wrong; the editor wrote it himself. "Well, anyway," as Bobby Gaylor says, it was a "good suggestion" and the *New Era* far from being a little "Two-fer" is a bright, newsy little sheet, a credit to the town and to its editor. We have made similar remarks before.

THE PERNICIOUS GRUMBLING HABIT

Do not let your child acquire the habit of grumbling. Stop the first beginnings and it will never become a habit. If there is just cause of complaint, try to remedy it; if there is no possibility of improvement, teach that silent endurance is the best way to meet the inevitable. It is never wise to stay in a place and grumble. If the things you dislike cannot be altered, change your environment. If on reflection you decide that, balancing one thing with another you would rather bear the ills you know than fly to others that you know not of, bear them in silence.—February *Ladies Home Journal*.

The above is a suggestion that everyone should heed. Grumbling, or "worrying" as it is more politely termed, will cause more unhappiness in a home than many other faults of a graver nature. Have you not felt like shaking the chronic grumbler whose complaints over infinitesimal grievances made home unhappy? Such a one seems to "enjoy being miserable," to use a "Paddyism," and is never content unless discontented. Each household should establish a "don't worry" club, to which all the family should be compelled to belong and whose motto should be the one which a wise mother of our acquaintance taught her little daughter, "Never worry over anything you can help; but instead remedy it; and never worry over anything you can't help, since worrying will do no good.



WINTER FEEDING OF SHEEP AND RANGE CATTLE IN YELLOWSTONE VALLEY, MONT.—Whitney, Bul 14, Div. of Soils, Dept. of Agri.

THE IRRIGATION AGE.

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NO. 6.

THE PROGRESS OF WESTERN AMERICA.

The Work in Congress It is with gratification we note the work that has been done for the cause of irrigation during the present session of Congress. Much has been accomplished, for though we cannot point to specific results and say "we have gained this or that; our mission is successful," we can see a general growth in interest in the subject which is an indication of the final success of the cause. Storage reservoirs for the West are not yet an assured fact, but the resolution of Feb. 7, calling for a concise report on this subject from the Secretary of the Interior, proves that the earnest and untiring efforts of the men who have labored for years are bringing results at last. They have succeeded in persuading Congress that irrigation is not merely a local question affecting the welfare of the farmers of some of the western states and territories but is a national problem, of vital importance to the whole country, east, west, north and south. The construction of storage reservoirs for the impounding of flood waters comes within the province of the general Government as does the constructing and maintaining of light houses and other works of internal improvement, as Mr. Newell, hydrographer, points out in his report on the subject.

The irrigation investigations carried on by the Department of Agriculture during the past year have been of great value, despite the fact that the Department was hampered by lack of funds, a sufficient appropriation not having been made to admit of the work carried out as

it would otherwise have been. Last year the Senate inserted \$27,500 in the agriculture appropriation bill for irrigation investigations, but this was cut down to \$10,000 by the conference committee, who did not realize the importance of the work. This sum was totally inadequate for the purpose and the Secretary of Agriculture is to be commended upon the results achieved. This year he asked Congress for \$50,000 with which to continue his investigations, but the Committee of Appropriations recommended an appropriation of \$25,000, 50 per cent. of what was asked. An amendment was offered, increasing this to \$35,000, which it is hoped will be available this coming year.

Senator Perkins, of California, and Senator Warren, of Wyoming, in connection with the amendment explained what had already been accomplished by the appropriations made in the past and what it was proposed to do in the future. No one is better fitted to speak on this subject than Senator Warren and no one deserves more praise than he for the manner in which he has worked for the irrigation industry. Thoroughly posted upon all phases of the subject, practically as well as theoretically, he has "borne the heat and burden of the day" and worked constantly and faithfully in the interest of irrigation and the state which he represents. It was through his efforts that under the last River and Harbor Bill the appropriation was made for the survey of reservoir sites in Colorado and Wyoming, the result of which is summed up by

Capt. Chittenden, who had charge of the work, in the elaborate report he made to the Government. The paper by him, which we present this month, gives his impressions of the country through which the survey was made and the characteristics of its water supply.

To Build Reservoirs In his report Capt. Chittenden said he deemed "a comprehensive reservoir system in the arid regions of the United States absolutely essential to the future welfare of this portion of the public domain," and therefore he recommended that one-seventh of the total amount of each River and Harbor Bill be set aside to build reservoirs. "The use of the waters so stored should be absolutely free to the public forever, just as the canals, harbors and other public works are free for general use without toll or levy of any kind."

Prominent in support of this policy, during the recent session of Congress, was Senator Carter, of Montana, who introduced an amendment to the River and Harbor Bill, appropriating generally five million dollars for building storage reservoirs in all the semi-arid and arid-land states and territories, the water stored to be used for irrigation. The fact that, by storing the head-waters of the Missouri, the Platte and the Arkansas rivers in reservoirs in the Mountain Valleys, the disastrous floods which overflow the south could be prevented and the millions of dollars now spent yearly on levees in the vain endeavor to keep the waters in check, thus saved, proves that the subject of reservoirs is not a local question, affecting the western states only, but is one of far-reaching import.

In Behalf of the Congress The Senate Committee on Commerce gave a full hearing to those who urged the adoption of this policy. Those who spoke in advocacy of it included, besides the senators of Montana and Wyoming, already referred to, Geo. H. Maxwell, representing the National Irrigation Congress. In behalf of this body he urged the construction of reservoirs, which policy was embodied in the resolution passed at the Congress at Cheyenne last September.

"We favor the preservation and de-

velopment of our national resources by the construction of storage reservoirs by the Federal Government, for flood protection and to save for use in aid of navigation and irrigation the flood waters which now run to waste and cause overflow and destruction, as recommended in the report of Capt. Hiram Crittenden, and we urge the adoption of the recommendation of this report as to the construction of storage reservoirs in the arid regions, as a part of the national policy of internal improvements."

Mr. Maxwell spoke chiefly with reference to the immense benefit the reservoirs would be as a flood protection to the southern and middle states at the annual rise of the Mississippi. By his zealous efforts Mr. Maxwell has proven himself a worthy representative of the Irrigation Congress.

Under the department of Irrigation in this number, we give a more extended account of the addresses made by Senator Warren and Mr. Maxwell, together with additional information on the pamphlet by Mr. Newell.

The Closing of Congress While "old glory" was waved and patriotic songs were sung by the enthusiastic members, the Fifty-fifth Congress adjourned sine die, March 4. Owing to the number of vital questions with which Congress had to deal, this session was of unusual interest. While many mistakes were made, both of omission and commission, its record, as a whole, is fair and in its closing acts of ratifying the treaty of peace and making Dewey an admiral, it left a pleasing impression on the minds of the people. The President and Congress have been more in harmony throughout the session than might have been expected from the diversity of opinion held on the many important issues.

It is to be regretted that, with an extra appropriation of 482½ million dollars, due to the expenses incurred by the late war with Spain, the ordinary appropriations made by the Fifty-fifth Congress should have exceeded those of its predecessor by 39½ millions. The regular appropriations voted by the last Congress amount to \$1,084,300,000, which, with those of the war appropriations, aggregate \$1,566,000,000.

As Mr. Cannon, Chairman of the Com-

mittee on Appropriations, points out, an increase in the appropriations made by succeeding Congresses is a necessity due to the demands of the increasing population. This is true in a measure, but economy is not one of the virtues of Congress, and while Mr. Cannon used his influence to check the increase, there is no doubt but what many of the appropriations might have been cut down or done away with entirely; that providing for the payment of old French spoliation claims, among them. Mr. Cannon states that the increase was due to the larger appropriations for pensions, the postoffice department, and the navy, for the construction of needed public buildings, taking the census, paying claims, improving the great waterways, and for the Paris exposition. The passage of the Loud bill would have materially reduced the post-office department expenses and there are other money-saving measures which might have been adopted. The attention of Congress was so taken up with the war that their lack of economy is more excusable than it would otherwise be. The *Chicago Tribune*, speaking editorially on this subject says: "For extravagant appropriations of this kind by the last Congress and by preceding Congresses there is no party responsibility. The popularity-seeking members of both the great political organizations unite in voting for lax pension legislation and in supporting river and harbor and public buildings jobs for the benefit of their districts, or, rather, for their own benefit, for they hope thereby to secure their re-nomination and re-election. There is no politics in the 'pork barrel.'"

Schley's promotion, which places him ninth on the list of Rear Admirals, occasioned general satisfaction in Congress.

None of the armored ships for the navy will be even contracted for this year, owing to the restrictions in the price of plate.

Beyond voting a million dollars to be expended by the president in investigating the two proposed canal routes, nothing was done regarding the Nicaragua canal bill.

It was with genuine regret that the members of Congress, irrespective of par-

ty, bade farewell to "sockless" Jerry Simpson, whose retirement to private life robs them of their chief fun-maker.

A Human Hero

In one of our exchanges we recently came across an article entitled "Leave Our Heroes Human" in which a protest was made against the practice of suppressing all accounts of the follies and faults of our great men and dwelling only on their virtues. This praiseworthy effort of the biographer to give us faultless heroes in the men who have made history is on the plan of "speak only good of the dead." It is this tendency that has caused us to regard the "father of our country" as a conceited prig, and to wonder how so faultless a being could gain the love and admiration of his companions, "Biography," says the writer, "is not written for children, but for everybody, and when adults read biography they read it to learn of what matter of stuff were made the heroes described." They want the hero to stand "revealed as he was—a man, with the same faults and foibles possessed by mortals cast from the same clay but in a more common mould."

Perhaps it was this same feeling which actuated the writer who gives us, in the *Saturday Evening Post* (Feb. 25) "The Unfamiliar George Washington." From it we learn with relief that the great George, so intimately connected in our mind with the cherry tree episode, was not quite perfect. It is darkly hinted, in fact, that on one occasion he did lie—not to his father but to his mother. When a boy of about thirteen, so runs the unauthentic legend, George was sent by his mother one evening to bring in the cow from the pasture and milk her. The cow was brought in but, not being fond of milking, George omitted that part of the task. Just as he was sinking into dreamland his mother asked if he had milked the cow. And the cherry-tree hero answered "yes," proving that he not only could tell a lie but that when he did it was a very bad one. The hatchet story is said to be a mere fiction, invented by the first biographer who desired it "to point a moral and adorn a tale."

"General Washington is known to us

and President Washington, but George Washington is an unknown man," says John Bach McMaster. Why we even celebrate his birthday on the wrong day, he having been born the 11th of February instead of the 22nd. This is due to the fact that under the revised system of chronology the date was advanced eleven days. It is the "Unfamiliar George Washington"—the *man*, whom Perriton Maxwell introduces to us in his admirable article. The man who, "masterful politician that he was, could boast of only ordinary qualifications as a man of peaceful pursuits; he was, after all, a personage of excellent character upon whom fortune smiled, and who was wise enough to make the most of men and circumstances." He did what few of us do—grasped the opportunities that came his way.

"The Unfamiliar Washington" was somewhat of a sport; the sums he won at cards would excite the envy of gamblers, and he also indulged in lottery investments; dancing, riding, hunting were favorite amusements, all of which, however, he considered tame in comparison with a cock fight. He was fond of liquors—though not a drunkard; was also very fond of dress, being in his youth quite a

leader of fashion; his hands were so large that his gloves had to be made to order, and his boots were No. 13. Being forced to leave school at an early age, he had but little education and though fond of reading and possessing a wonderful memory, he never became either a correct speller or good grammarian.

Such, according to Mr. Maxwell, was George Washington, the *man*. Not a god; not a genius; simply a brave, honest man, who did his duty conscientiously and who, in leading his feeble forces to victory against overwhelming odds, laid the foundation of this glorious republic. A man whose sterling worth and great achievement make him worthy of our honor and praise.

**Send
In
Your
Names.**

Those who are desirous of becoming members of the Farmers' Homeseekers' League are requested to send in their names to J. Hammond, member, 225 Dearborn street, or to the IRRIGATION AGE. The names will be registered and as soon as a sufficient number of members have been obtained, locations for settlements will be secured and colonies formed. For fuller information regarding this organization see February number of the AGE. *



HORTICULTURE IN MEXICO.

THE NATURAL ADVANTAGES OF THE REPUBLIC FOR FRUIT GROWING.

BY LEON N. STUART,
Gen'l Mgr. La Virginia, Montemorelos, Nucuo Leon, Mexico.

The great diversity of climatic conditions of Mexico, caused by its physical location in the tropics, with its high altitude of tablelands and mountain system, enables fruit growing to cover a wider range of varieties than are found in most any other country.

From the Gulf on the Tropic of Cancer running south and gradually rising higher to an elevation of four thousand feet in the southern part and widening out into the interior, crossing over to the Pacific side and north to Mazatlan, we have the pure tropics entirely free from frost, in which the most delicate and luxuriant plant growth thrives, such as vanilla, mangoe, bananas, pine apples, papaya, coffee, rubber, etc.; while bordering on the same, but extending up to a higher plane and farther north, we get a semi-tropic region which is subjected to a few light frosts, but not heavy freezes. It is here that the finest quality of oranges, lemons, agua-cates and pomegranates are grown; farther north, and up to 6,000 to 8,000 feet high, on the great table lands, we get the temperate zone, with all its varied products quite similar to those of the Middle and Northern states of the United States.

Commencing on the low coast lands and following the same line of latitude, we find that every 280 to 400 feet ascent is equivalent to going one degree latitude north, hence as we go from the lower lands to the higher plateaus, there is a change from the luxuriant and delicate tropical plants to the sturdy pine and oak trees of the far North. As the temperature changes so also changes the humidity and rainfall, the low warm lands being bountifully supplied with 100 inches annually at the Isthmus to 25 or more inches at the north; the semi-tropics having a much lighter rainfall, irrigation is required to insure full crops yearly; while in the temperate and great central districts we find the true arid zone, with its dry, clear, rarified and invigorating climate so conducive to health.

The semi-tropic and temperate lands comprise the greater part of the territory of Mexico and it is here that man comes to help nature by taking out in canals water from the streams that come from the high mountain peaks which rise above the general tablelands and,

conveying it to the rich lands of the plains, supplies the moisture for plant growth that nature failed to provide, making it rich in products for the maintenance of man.



OLD ALAMEDA, NEAR LA VIRGINIA.

Irrigation, as now practiced in general, is on the same system that it was 200 years ago when the ditches were first planned by the Spanish and excavated by the Indians. But few dams have ever been built to store the surplus waters of the rainy season or those that run to waste when not in use on the growing crops, therefore the area cultivat-

ed now is just the capacity that the running streams will irrigate, during the growing season, which no doubt could be increased two or three fold by a series of dams and reservoirs and by paving the ditches. The method used to take out water from the streams is gravitation; the ditches running far enough up to tap the water at the river bed. At present there are no high water assessments to pay, for whoever owns land under irrigation owns water rights with the land and the only expense is cleaning and keeping the ditches in repair. The main canal is called toma, the branches, acequis, while the laterals for irrigating are called regaderos, and to irrigate is regar. Water is measured by surcos—48 surcos make a buey. A surco is a flow of $6\frac{1}{2}$ litros per second or equals 1.43 gallons per second, or 85.8 gallon per minute



ORANGE GROVE—FOUR YEAR OLD TANGERINE TREES.

One surco equals $9\frac{1}{2}$ inches. Hence a buoy of water is equivalent to about 456 inches California measurement. One surco, in 24 hours flow, will irrigate one and one-half acres of land. The flooding system is generally used by native Mexicans in irrigating; they are very

good irrigators but are too wasteful with their water. More cultivation and less irrigating would produce much better results, but they will never change their methods here.

Mexico offers today, with her genial climate, her millions of acres of rich soils, of undeveloped lands, a great field for the capitalist to build storage reservoirs along the many streams, impounding the enormous amount of waste water which is supplied during the wet season, and that which runs off unused in the winter months, taking these waters to the new



LA VIRGINIA—FOUR YEAR OLD ORANGE TREE.

lands that have lain dormant for centuries for the lack of sufficient moisture to be productive.

Many fruits and plants of Mexico are indigenous, others were brought from Spain and other European countries by the padres, years ago, but when planted in their proper place in Mexico, the quality was at once admitted to be of the best—and when the horticulture of Mexico shall have been brought up to the standard and science of France, United States, Italy and other



LA VIRGINIA—SCENE IN PATIO.

countries by man's assistance of nature, Mexico will be the leader in the finest fruits in the world.

In Mexico this interesting industry is at present confined principally to seedlings, as but little effort has ever been given to the culling out of small, inferior fruit or to propagate only the largest and best by budding, but notwithstanding this failure on the part of man, the general average in quality is good.



LA VIRGINIA—TWO YEAR OLD ORANGE GROVE.

chards in Mexico on a large scale, but instead we find in the yards, gardens and lots of the villages and towns a general assortment of trees of all ages and sizes. Now since the new era of building railroads has made it possible to sell fruits in the distant markets of the Republic and the United States the President and his Governors are giving much encouragement to capital and enterprise to increase Mexico's horticultural industry and bring it up to a higher standard.

Their efforts are being well rewarded, as is seen in the new orchards of budded trees of standard and tried varieties, that were recently, and are now, being planted by both foreign and Mexican capital.

At Montemorelos, state of Nucoo Leon, with a semi-tropic and arid climate, on latitude 25 degrees north, and at an elevation of

The reason that fruit growing has been left so dormant and limited here has been for the lack of transportation facilities; until recent years there were but few railroads and the marketing was confined to the local districts of production, except such exchanging as could be carried on by burro trains; hence there are but few commercial or-



ORCHARD SCENE, NATIVE WORKERS.

1,400 feet, has recently been started La Virginia, an orange plantation, (the largest in Mexico) with an assortment of deciduous and other fruits, whose results so far have been most gratifying and whose future appears quite bright.

With the advent of the M. & M. G. R. R., giving direct connections with the vast interior and the United States, there came prospective investors into this old settled, but undeveloped, district, who



LA VIRGINIA—ROSE AVENUE.

found a rich calcarious soil, in places red with iron, which produces such fine flavors and colors in fruit, and an abundance of water from a stream that headed far back into the towering mountain range near by—whose waters had been used for irrigating for 200 years on vast fields of corn and sugar cane.

quaint, white adobe houses were many old orange trees of the advanced age of 75 years, which were still bearing crops of 1,000 to 4,000 oranges each, of a fine texture and most delicious flavor—these were seedling trees whose origin had been Spain many, many years ago. They showed they had had but little care or cultivation and in producing such crops of fine fruit, proved this to be a true orange district—hence the decision to locate La Virginia at this place something over four years ago. The first orange trees were brought from California and planted on lands that had grown crops of corn for ages, and at once La Virginia began to assume life and shape under the new regime. Today there are fifteen thousand orange trees, standard varieties from California and Florida and six thousand peach,

In the numerous gardens, surrounding the



HEADQUARTERS AT MR. TAYLOR'S.

pear, plums, etc., with the prospect that more will be added the coming spring thus gradually increasing the plant to its fullest capacity.

The assortment of roses and ornamental shrubbery has kept pace with the growth of a place of this size and there are but few days during the year that the fragrant roses, orange blossoms, honeysuckles, etc., are not filling the air with their delicate perfumes.

Several other orchards were started about the same time as La Virginia, and are doing well, viz., those of Taylor & Lawrence, Berlanga Huos., W. A. Davidson, T. J. Goff, W. B. Butcher, J. Ingram and Richard Mitchel.

The oranges here begin to ripen about Oct. 1st and is fully ripe for November and December and by Jan. 1st are all shipped.



LA VIRGINIA—ORANGE TREE IN BLOOM.

This is truly a land of manana and anyone coming to Mexico to settle should bring a large supply of patience and expect to do things in a slower and easier way than at home and to leave his "rush" behind as it will only bring him vexation and trouble here. The people have been doing business in their way for many generations and there is no use to try to change them in a day or week. The laborers here let each day take care of itself and take the future as it comes. If a man can live by one day's labor per week, that is all the work he will do in that week. He also prefers to work by daily tasks, even should they be larger than he would do in a steady all day's work, for

then he goes at it early and rapidly and will get through with it by the middle of the afternoon so he can "rest" the balance of the day. In this way is most all the work done on the large haciendas (farms) of Mexico.

When in Mexico treat the laboring class firmly; the better class as you would your other friends at home, only be as polite as they are and you will be respected, honored and beloved as you would in your own country, for they are a kindhearted and generous people and have many superior qualities, or at least I have found them such in my few years of association in their sunny clime.

Practical results were first demonstrated last year, when Messrs. Stuart and Robertson sent in May and June from La Virginia peaches and small fruits over the greater part of Mexico and to many points of Texas; and also in November shipments of oranges were made to St. Louis and other markets of the United States, including California, which is very critical. These fruits excited general interest and were declared to be of an excellent quality. Such gratifying results have interested the Mexicans and they are now putting out orchards of budded trees, constructing seed-beds and adding many innovations, "como los Americanos."

With such new life Montemorelos will, without some unforeseen cause, become one of the most prominent orange growing sections of the Republic.

TIMIDITY—A HINDOO FABLE.

A silly mouse, thinking each thing a cat,
Fell into helpless worriment thereat;
But, noticed by a wizard living near,
Was turned into a cat to end its fear.
No sooner was the transformation done,
Than dreadful terror of a dog begun.
Now, when the wizard saw this latest throe,
"Here, be a dog," said he, "and end your woe,"
But, though a dog, its soul had no release,
For fear some tiger might disturb its peace.
Into a tiger next the beast was made;
And still 'twas pitiful and sore afraid,
Because the huntsmen might some ill-starred day,
Happen along and take its life away.
"Then," said the wizard, turning to his house,
"You have a mouse's heart—now be a mouse."
'Tis so with men; no earthly help or dower
Can add one atom to their early power.
Them from their smallness nothing can arouse—
No art can make a lion from a mouse.

—Joel Benton.



ELK LAKE, RESERVOIR SITE ON PINEY CREEK, BIG HORN MOUNTAINS, WYO.

THE IRRIGATION PROBLEMS AND POSSIBILITIES OF NORTHERN WYOMING.

SOME GENERAL IMPRESSIONS.

BY CAPT. H. M. CHITTENDEN, Corps of Engineers, U. S. A.

The especial purpose of my tour through Wyoming in the months of August and September, 1897, was to investigate the question of the construction of reservoirs in the arid regions through the agency of the general government. As the result of my investigations of that particular subject has been embodied in an official report which has been made public, and as Mr. Mead in his paper has covered pretty thoroughly all other matters relating to irrigation and water supply in the country traversed, I will attempt to give here only my general impressions of the trip.

The section of the country in the neighborhood of Piney Creek presented one feature, not mentioned by Mr. Mead, which particularly attracted my attention, and that was the extent to which irrigation may be carried in a very rough and uneven country. Accustomed as I had been in visiting other sections of the west, to find irrigation generally practiced on broad, flat areas where the distribution of water seemed to be a matter of great simplicity, I had involuntarily arrived at the conclusion that this class of topography is alone well adapted to irrigation. But what I saw in the above locality altered my opinion in this respect. I cannot call to mind another tract, outside of the mountainous areas themselves, where the topography is so uneven and broken as that just north of the divide between Piney Creek and the upper tributaries of the Tongue River. Yet nearly the whole of this tract was under cultivation, the ditches winding in and out among the hills and the slopes covered with meadows and fields of grain. The general effect was on the whole more pleasing, though less impressive from the point of view of vastness, than the broad expanses of even land in other localities where cultivated fields succeed each other as far as the eye can reach.

Piney Creek was about the most favorably conditioned of any of the streams which I visited in regard to storage reservoirs. There will be no difficulty in conserving the entire flow of that stream above a point about opposite Lake De Smet and utilizing it in agriculture. There is reservoir capacity enough clearly in sight, and land enough to absorb the full resources of the stream. Fortunate would it be if

all streams in the arid regions were equally favored by nature in this respect.

On our second day out from Sheridan we visited Dome Lake a nascent summer resort in the Bighorn Mountains under the patronage, I believe of the Burlington Railroad. It may have been the surpassing beauty and sublimity of the scenery around Cloud Peak Lake, which I had seen but a week before, that caused this much-advertised spot to appear altogether tame in comparison. More probably, however, it was the desolate appearance of the surrounding country which is almost divested of the noble forests that once covered it. Here indeed is an impressive example of the ruin that has spread over many of the forest areas of the west. It alone is sufficient to convince any believer in the necessity of preserving our forests, that prompt and vigorous measures ought to be taken by the government to save what remains, and to restore what has been lost.

In this connection I may mention a matter which came to my attention about a week before. The day before Mr. Mead joined me, I made a short excursion from Buffalo, up the valley of Clear Creek to the old military reservation of Fort McKinney, where I had spent some time nine years before, surveying its boundaries. I passed through the abandoned post, now the property of the State of Wyoming. The perfect state of preservation and the neat appearance of everything spoke highly for the care with which this piece of property is being preserved. But I imagine that the state is at a loss to know what to do with it. It at once occurred that here was a central position from which to protect the forests of the entire Bighorn Range. Let the post of Fort McKinney be reoccupied by United States troops, held there to do duty as foresters. If this is not considered a proper function for the regular troops, let a regiment be raised whose duty shall be confined to that of forest protection and let a portion of it garrison this post. There is no good reason that I can think of why the army should not afford the basis of an efficient police system for our national forests; there are many and excellent reasons why it should.

From Dome Lake our party proceeded into the Bighorn Basin, a valley renowned in all the history of the west. I had always been desirous of visiting this valley and embraced the present opportunity with much earnestness. My expectations as to its agricultural possibilities were pitched pretty high, and I can hardly decide as yet whether they were equalled or the contrary by what I saw. I think that the general impression, as we rolled down the long western slope of the Bighorn Range, was one of disappointment. The scene of widespread desolation, as the endless vista of naked, ashy hills unfolded itself to our view, was not calculated to inspire a feeling of confidence in the future of such a country. It did not seem capable of sustaining a living thing. Yet we had before us the evidence of

abundance of life in the innumerable sheep tracks that covered the ground in every direction. I remember that one of the most spirited arguments that divided our little party was caused by the appearance of these paths which encircled in parallel bands a distant hill, and bore so much the appearance of natural stratifications that it was difficult to tell what they really were.

And speaking of the sheep of this country I may say that one fact appeared to me indisputable; namely, that the unrestrained grazing of these vast herds over the public lands of the west is ruinously destructive to their best use as grazing lands. It seems to me a thing of the highest importance that these lands be divided as far as possible so that they may pertain to the lands under cultivation in the valleys, giving to each holding of irrigated land an extent of grazing land, and giving to every tract of grazing land access to water somewhere. I believe that the outcome of such an arrangement will be that more cattle will be produced in that country than were ever produced under the free range system. The cession of the lands to the states in order that they may be thus leased to *bona fide* settlers is a question of vital importance to many of the western states.

After we had gotten down into the immediate stream valleys of the Bighorn Basin the country took on a more pleasing appearance. The rich soil of the bottom lands was here and there under a state of cultivation which made it an entirely legitimate flight of the imagination to picture a dense and prosperous future population in those valleys.

The Bighorn River fully realized the expectations I had formed of it from the many descriptions that have come to my notice. It was a strong, rapid stream, almost perfectly clear where we crossed it, but evidently liable to be completely beclouded at the faintest suggestion of rain on the barren hills among which it flows.

The growth of irrigation in the Grey Bull valley gave convincing evidence of what this country is yet to be, and I remarked to Mr. Mead that the future would see within its limits a population equal to that of the state of Wyoming at present. I need enter into no further comments upon this valley than to say that the abundance of water in the main stream and its tributaries made the purpose of my visit seem minus a sufficient motive, for surely it will be many years before there will be any pressing necessity for the storage of water there or in any other portion of the Bighorn Basin that fell under my observation.

Of all the localities visited by our party, the Wind River valley has left me with the most agreeable impression, unless possibly it is equaled in that respect by the valley of Jackson Hole. As we topped the Owl Creek Divide and looked expectantly across the valley of Wind River for the vast wall of mountains which we knew lay on the farther side, the deep haze made it for an instant indiscernable; but

we soon detected the dim outline, only that its great height and extent at first made it seem impossible that it could be a portion of the earth upon which we stood. Well does it merit the high place which it holds in the history and tradition of this region.

Wind River appealed to me as one of the most beautiful streams I had ever seen, and I cannot now recall one which I would place ahead of it in this respect. It was perfectly clear, and the powerful volume of water which it carried along with marvelous rapidity, now in deep boiling pools and again spread out in sparkling ripples over the wide gravel bars, generally confined within banks of dense willows, and overshadowed by groves of lofty cottonwoods, composed a scene which left little to be desired by the most critical observer of nature.

The fact that we were upon an Indian reservation soon suggested itself in explanation of the absence of habitation or cultivation in that broad and fertile valley; but I then thought, and still think, that if I were to have my choice of a tract of land in the State of Wyoming, I should select it along the grove-dotted shores of Wind River in the vicinity of Crow Heart Butte.

Union Pass, as a way of getting over Wind River Mountains, was a distinct disappointment to me. Discovered in 1860 and used ever since, frequently referred to in official reports as an exceptionally easy pass, I had expected to find one of those low and gradual slopes across the mountains which are always sought for as highways of travel. Instead, we found at the northern approach an excessively long and steep ascent which finally landed us on the bleak and barren summit of a mountain, so obviously out of our desired course and so much higher than the land to our right, where we ought to have gone, that it excited considerable adverse comment among the party. The accident which led to this peculiar choice was no doubt the open space on the summit where the original discoverer was able to fix his bearings from prominent points in the surrounding country. This was an important matter at the time, but is no longer so, and it is to be hoped that a better and more direct route will be selected when government appropriation for this road is made advisable.

The summit of the pass was without exception the windiest spot we encountered, and from the oblique growth of all vegetation in the vicinity, it was evident that the wind is blowing there most of the time and in one direction. What connection, if any, this fact may have with the name of the mountain and river is of course conjectural, but I think few of our party would have doubted the propriety of "Windy Pass" for the point where we crossed.

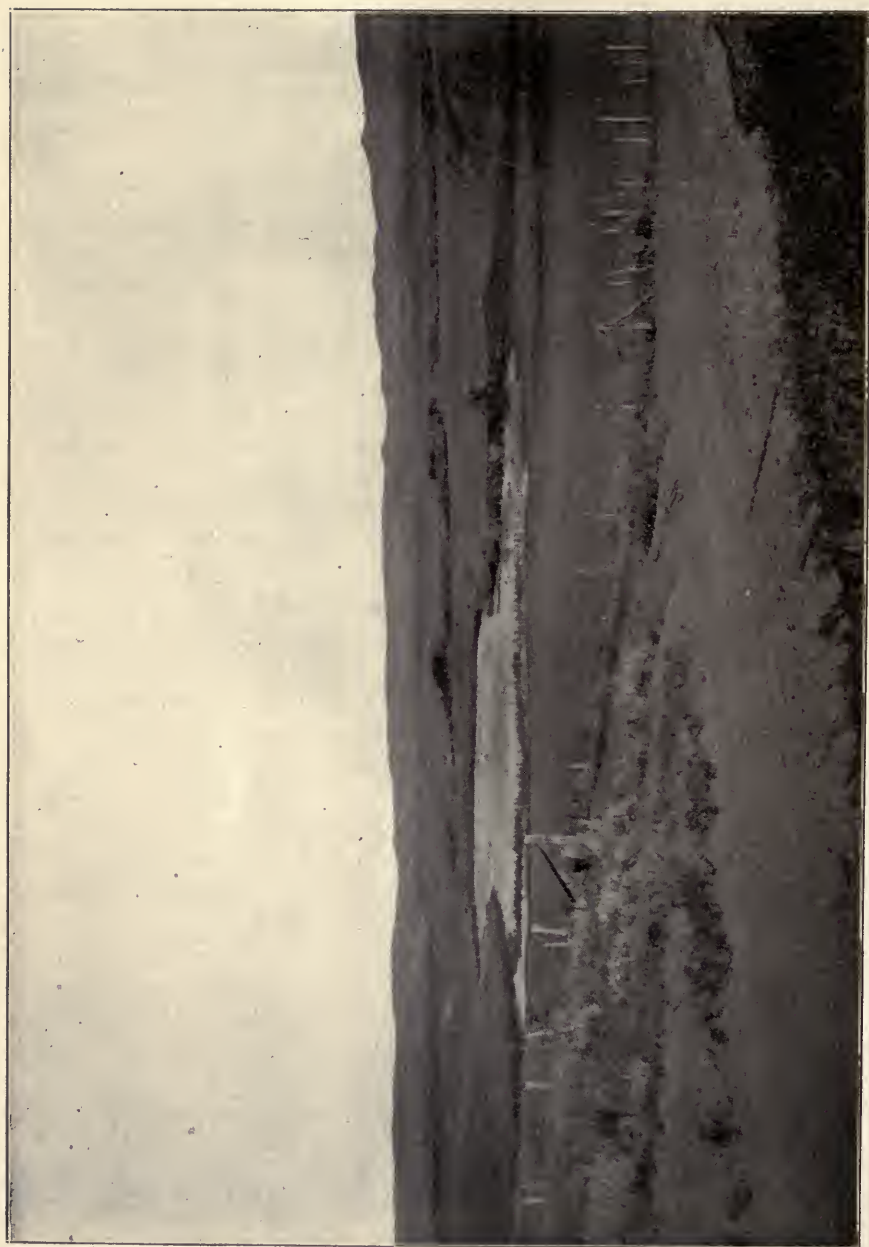
The southern or western descent from the pass was a process which no one could tell the end of. Crossing some of the headwaters of the Gros Ventre, we passed over onto the watershed of Green River and then swung back onto the Gros Ventre. The landscape from the point where we overlooked the celebrated Green River was

very fine, and disclosed a worthy gathering ground for the waters of one of the most noted streams of the west. It is a stream, however, which I fear will be of less use than almost any other in the agricultural development of the west. At its headwaters the land is so elevated that but few crops can be raised while further down it sinks into those deep gorges, of which the Grand Canon of the Colorado is one, while its diversion to the uplands seems physically impossible. Perhaps near the end of its course in the Gulf of California, it will yet be used in the tropical climes of Arizona or California.

While we were yet on Union Pass we saw for the first time what every traveler in that region always looks for, the lofty peak of the Grand Teton Mountains. Wherever seen it is an impressive sight, but it was especially so at this great distance, from which it looked like a thin spire piercing the sky, scarcely visible except for the patches of snow that covered it. Two days elapsed before we reached its base, but it was in view at intervals in the meanwhile, and we could well appreciate how important it must have been to wanderers in the early days when no roads crossed the country. In approaching it we were at a loss to see why this peak and its immediate neighbors came to be called *The Three Tetons*, for there seemed to be several of the lesser peaks of equal prominence. But two days later, when I found myself on the other side of the range and looked at it from the west, the explanation was obvious enough. From that point of view, there are three distinct peaks which stand out prominently above all others.

This wonderful range of mountains and the no less wonderful valley at its eastern base have received the enthusiastic encomiums of every traveler who has seen them. This continent affords not their equal, and it is a great pity that the tour of the Yellowstone Park, which lies to the north, cannot be made to embrace them. To the lover of sublime and beautiful scenery they are beyond praise.

Mr Mead has spoken of the agricultural possibilities of this favored valley and I will say nothing upon that point. It was here that I left the rest of the party, who turned north into the Yellowstone Park, while I made my way to the nearest railroad station, Market Lake, Idaho. Our hospitable host in Jackson Hole Valley, Mr. R. E. Miller, treated us very shabbily in the matter of weather. We were received at his place by the only rain of any consequence which we encountered on the entire trip, and a rain which was long and vigorous enough to make up for previous deficiencies. In fact I have seen few more severe downpourings than that which prevailed nearly the entire day following our arrival. Mr. Miller, however, atoned as far as possible for this inhospitable reception by accompanying me on my first day's journey, which I found it impossible to postpone for better weather. On horseback we made our way for seven hours in a drenching rain, across the summit of the Teton Range and into the



POND IN PRAIRIE DOG VALLEY, ONE MILE NORTH OF MASSACRE HILL, WYO.

State of Idaho. Teton Pass is incomparably the most difficult pass I have met with in the mountains. Its slopes are so steep that one would scarcely believe it possible for wagons to cross did he not see the evidence of their having done so. Unlike most passes, the two slopes of this one come together almost like the top of a roof, with no space on top; and it is but a mild exaggeration to say that a saddle horse on arriving at the top is laboriously digging it way up on one side with its hind feet and vigorously bracing with its fore feet to keep from sliding down the other.

On the summit of this pass we were in dense clouds from which the rain came down in perfect floods until we were drenched through and through. The road carried such torrents of water that it seemed unsafe to travel in, but the occasion afforded an excellent opportunity of seeing how forests protect mountain slopes from erosion by the elements. The heavy rain causes streams of water to pour down every gully or depression, but wherever this was in the forest areas the water came out clear, notwithstanding its heavy volume. Wherever we came upon open tracts destitute of vegetation the surface water was invariably laden with sediment.

That night we rested in the little village of Victor, being more nearly played out than we were ready to admit. Next day the eighty miles which I had to travel to reach the railroad took me through the Teton valley, or as it used to be called, Pierre's Hole, and down Henry and Snake rivers to Market Lake. Pierre's valley is well situated for the development of irrigation, although I apprehend that if its lands are ever all brought under cultivation the water supply may not be equal to the requirements. The valley is some 30 miles long, and I should say 10 to 15 wide, and will yet be the home of dense population.

In the valleys of Henry Fork and the main Snake River, there was a degree of system about the distribution of water that I had not elsewhere noticed. I was greatly struck by the extent of these distribution systems, their regularity and thoroughness of construction, and particularly by the way in which the canals or ditches were raised above the general level and held between embankments. Although in the rapid progress we were making, I saw only what was visible from the highway, still there was enough to give me a high idea of the thrift and good management that pervaded this entire country. The question involuntarily arose, What people is this that understands its business so well and pursues it so industriously? I did not, however, have to ask, for the inscription "L. D. S.," which crowned the doorways of the numerous churches we passed gave me the answer. I must say that this exhibition of material prosperity did more to incline me toward the doctrines of this much-abused people than did the persuasions of my driver, an ex-Mormon missionary, who seemed to think this an excellent opportunity, and myself a promising subject, for the resumption of his abandoned calling. Although the general

effect of his remarks was extremely evanescent, he did at one point excite my curiosity at his apparent insight into the thoughts of others, for although I had said not a word of my business, he evidently knew that I was looking up the subject of reservoirs. At least I inferred as much, because, among his persuasive arguments, he held out the following mild and attractive view of the subject of damnation—that it did not mean at all eternal punishment or endless suffering, but simply a postponement of happiness which will later return in fuller measure, just as in *damming* a stream, the waters are held back for a season, only that they may eventually flow forth to greater harvests and more bountiful fruition. This simile, metaphor, or whatever form of parallelism it may be best designated by, was too conclusive to admit of any reply and I remained lost in reflection until the welcome light in the railway station at Market Lake burst into view.

The general result of my long journey was to confirm the favorable opinion which I have held upon the subject of irrigation since my first acquaintance with the West some ten years ago. Although I have not entertained the visionary hopes of those who expect to see a garden spot throughout the entire West, and who believe that the time will ever come when there will not be a great American desert, still I have always been of the opinion that the future greatness of that part of our country, no less than of those sections blessed with an abundant rainfall, is bound to rest ultimately upon its agricultural development.

NORTHERN HIBERNIA.

AN AMERICAN IRRIGATION ENGINEER'S PROFESSIONAL SURVEY THROUGH THE COUNTRY.

BY LODIAN LODIAN, C. E., Paris, France.

(Original for this Journal.)

My chief object in this second trip to the north of Ireland was to make various hydrographic surveys in connection with a call for a report on the projected isthmus to connect septentrional Anglia and Erin. As this is also a big irrigation project, lower down I will say a little relative thereto.

My professional researches brought me in close contact with the poor men, women and children who are the backbone of Ireland; and the memory of this short sojourn is filled with pleasure at the frank, open character of the people, and the charming bonhomie and kindness with which they meet those in whom their keen perception detects sympathy. The Irish boys and girls have a most attractive ingenuousness about them—that is, the poor cotters' and small farmers' children you meet in the hills and in the glens, looking after the sheep or going to milk their small goats and cows. One peculiar habit I noticed was that of the barefooted and bareheaded Irish girls, in perchance returning with some purchases from an adjacent village, of sheltering themselves under one shawl—not from any need of shelter against adverse weather, but simply from a sort of clinging lovingness of nature, adherent in the mass of poor Irish.

As a rule, they are keenly sensitive, appreciative and accurate in their ability to read character, and, with their open impulsiveness, they act quickly upon their judgment in meeting a stranger. Their facility of utterance contrasts remarkably with what holds with the same class of farm girls in England, who generally lack words for a prompt reply. Here, in this respect only, the Irish are distinctly French-like. We are apt to forget that their mother tongue is Erse, and that they have had to learn another language—the English—which they often speak with facility, seldom hesitating for words to express their ideas, though the broad vowels, full r's and strongly aspirated h's largely inflect their speech. The mountain air seems to bloom on their cheeks and add vivacity to their sparkling eyes; and the purity of their lives to make them speak from their souls, rather than simply by their mouths as is the case with more educated people.

I overtook two of these girls in an old water-worn lane amid the hills in Antrim, my arrival interrupting an apparently earnest conversation, and diverting their attention to my photographic kit. After a nod and a smile in a short walk, we arrived at a broken bridge or culvert, the arch of which had tumbled into a deep gully in the hill; and this took my fancy for a view. Their curiosity increased on my opening out the case, uncovering the instrument for focusing, and they were delighted when asked to hold the tripod on the rocky ground. Just then a gust of wind carried off one of my numerous papers contained in the kit, and off went one of the girls in hot pursuit after it, over the stone fence, across the field, and away into the stream filled with boulders. Finally she "heaved" (brought) it to me—a worthless scrap—for which I thanked her as if I considered it of real value. On showing them the inverted reflection on the ground-glass, an explanation of the inversion was required, and this (not having time for a lecture on optics) I satisfied them by saying, "Oh, that's a reflection merely, as you sometimes see the moon in the water."



I took two views here, and then made them merry with my proposal to photograph the two under their shawl. "I wish it were Sunday, for I then wear a hat, you know," said one. "And I wear boots and stockings when I go to chapel," added the other, swelling with pride. I had to stop their merry chatter somehow, for I had no large diaphragms for rapid exposure. With a formidable ambition for effect, for contrast, the idea occurred to me to make one of them frown while the other smiled, but for some time I was not successful in provoking a frown, until I suddenly blamed one of them for causing me a loss of

time, and I immediately caught the sad expression it caused. I had then to beg the girl's pardon, for she had taken it so seriously and said with tears in her voice that my words had "scalded" her heart. All the rippling laughter was ended then for a time.

This little incident was one illustration I had of the sensitive nature of the humble Irish folks, to whose open soul, a wrong, though unintentional, is as a flaw in a gem—there, and irradicable while the gem lasts or memory survives.

They helped me with my instrument down the steep sides of the stream, and shortly after, I left the two poor Irish girls, who smiled at parting as in meeting them near the broken bridge on the road from Ballycavot to Torhead.

My objective point was the gulf stream at the narrow "north passage," where the Irish Sea flows between the shores, separated at present by a distance of twelve miles, though some guide-books give it as eleven miles—it would be more correct to say "Irish miles," which an Irishman explained as "being a bit over," which they were obliged to throw in beyond fair measure to their English conquerors. Fairhead is on the way to Torhead.

There are two giant's causeways, and the sites of both merit inspection by irrigation engineers.

Everybody knows the world-famous causeway in Ireland at its near connection with Scotland, so veritably manifest at the isle of Staffa and the intervening isles of Colonsay, Islay and Rathlin. There was, in fact, the Giant's causeway, making Scotland and Ireland one island. In what form that ancient way existed to occupy its nearly seventy miles junction, will ever remain an inscrutable mystery of nature.

The traveller in those parts, even if no geologist, sees the break in the basaltic columns, now submerged by the sea, and feels the conviction that the sea has filled the gap, made ages and ages ago by some convulsion of nature, which at the upheaval and subsidence, moulded the conglomerate of earths and metals into the myriads of mighty columns that reach for many miles down the coast of Ireland, southeast of the giant's causeway. This is the one referred to, but this is not now a causeway at all, but the mouth of the passage through which the gulf stream pours in from the north-west in never-pausing volume, estimated as being several cubic miles in extent, daily, and flooding the fore-shores.

An isthmus is proposed here, with great works, for gravitating suitable material to make up and fill in the lines of breakwaters extending from land to land. The iron, coal and lime-stone, which form the bold head-land "Fairhead," 640 feet high, is worked now, as it has been for ages past. One mountain rock, Knockalayd, 1800 feet high, also others, as Carnlea and Escot on the Irish coast here, and

equally suitable rock on the Kintire coast at Banan-head, Dess-point and other mining headlands opposite Torhead in Antrim.

Of course, the promoter, being surveyor and engineer, with a wide experience of work and means, did not fling off his idea, and leave it nebulous for others to mould into working order. He joined figures to facts, and proposed that it should be a national enterprise—this gigantic isthmus scheme—that should not be made a pretext for taxation, but should, by the reclamation of land, secure the redemptions by rents of a special issue of costless paper-money, and cheap metal tokens, and that all able-bodied convicts of the state should be worked here, however short their term of sentence. Details in other forms of a practical nature were briefly stated by the engineer. This is the other giant's causeway which would make the sister islands integral. The projector says "It is not engineer's work to fill up a big ditch." He has spent his time, means and money in his investigations, and has issued two editions of his "land-junction" pamphlets and charts and is now engaged on a third edition, looking forward to no gain from it "except financially," and willing, as heretofore, to give a part of his busy life to its fulfilment, which he says will cost about £3,000,000 of paper-money, and occupy three years to accomplish.

The study of Fairhead with its varied stone and mineral wealth ranging from brownstone, coal and limestone to basaltic rock and granite, possessed for me the greatest interest for the purposes of the proposed isthmus.

Fairhead is honey-combed with coal, iron, and limestone; and stone-workings and air-shafts, some of them ages old, are found. The bold headland, over 600 feet high, is backed by the round-topped hill of Knockalayd, nearly 1,700 feet high, with a pretty town—Bally castle—nestling almost between the "head," the "hill" and the sea at its narrowest part. Here I rested myself and my camera, after long tours afoot, from which I only returned at 9 or 10 o'clock at night, oftentimes seeing no one in twelve hours' outing but a shepherd or perhaps children, whose homes would be in some out-of-the-way nook in the hills.

The question of food may occur to the reader. This was surely the mountain air, for although possessing a fair appetite I often contented myself with a biscuit and drink from some rill.

When I arrived at Ballycastle for the first time early Sunday morning, I was shown good quarters by the kind village post-man. This was at Mrs. Blair's in the main street—a quiet, comfortably-furnished home, where without fuss a breakfast was at once set before me, along with slippers for my aching feet; and I may add that my welcome was increased by the proprietor's two nice daughters, who talked genially and without intrusiveness.

People know that touring is cheap in Ireland. so I shall astonish no one by mentioning that the tariff was 1 s per night for one room.

The table was equally reasonable, and with ample choice to order of fish, joint and fowl, besides which there was a large drawing-room for reading and writing, which for me was especially convenient with the plans and charts I was working upon.

[The writer wishes at once to acknowledge his indebtedness for collaboration in these and other notes to follow to C. Rinald, c. e., 'la lierre', Val-Roger, Villiers-sur-Marne, France.—L. L.]

THE BURIED MOTHER.

Out by the walls of the Danish town,
The graves stood cold as the night came down.

The Angelus prayer had long been said,
And the bells tolled out the Psalm for the dead;

It swung for awhile from the darkening steeple,
"Out of the depths," said priest and people.

Through all the close set town and towers
The doors were shut for the silent hours.

But a mother, buried for half a year,
Woke with a crying in her ear.

She woke with the vague sleep still in her head,
And clad in the shroud that wraps the dead,

She left the cold graves under the walls
And took the streets to her husband's halls.

She felt her long-dead bosom ache,
For her seven children were all awake:

And none had broken them bread that night
Or poured them beer or trimmed a light.

And none had laid them pillow or sheet;
The dust of the day was on their feet.

Two strove for an empty cup, and one
Was crying—that was her youngest son.

She washed and kissed them, and hushed their cries;
While tears pressed out of her long-dead eyes.

But their father, who lay on a lower floor,
Had heard her step on the corridor.

And he arose and came, and saw her stand
With the children clinging to either hand.

She said, "The crying smote my heart,
It broke my dreams of death apart.

"I was loath to leave these seven, I died,
But when have I slept when the child has cried?

"Take note, ere I pass to my many dead;
Your children woke and had no bread.

"No fire, no lamp: two were at strife;
One cried uncomforted. Tell your wife."

—Magazine of Art.

FARMERS' HOMESEEKERS' LEAGUE DEPARTMENT.

In Charge of J. HAMMOND.

To the Editor of the IRRIGATION AGE:

Dear Sir:—As the Farmers' Homesekers's League has as yet no paid secretary, and as my time is so taken up with my own business as to render it impossible for me to answer individually the numerous letters received during the past month, I am compelled to trespass on your valuable space to furnish our brother homesekers with the information they seek.

Applicants for membership should send to the secretary a statement somewhat as follows:

"1. There is, to my knowledge, nothing to prevent my becoming a useful and desirable member of the F. H. League and in joining I promise to do my utmost to fulfill my duty in the colony and in every way promote the best interests of the League.

2. My age is my occupation my family (if any) consists of aged

3. I have sufficient means to contribute my share of the cost of preparing the new settlement for occupation, provided the same does not exceed (\$100, \$200, \$300) per colonist (head of family).

4. I give the following as my references.....

5. I am willing to uphold the principals that (a) Every member of our colony shall be entitled to the fruits of his own labor. (b.) The best interests of the colony at large shall have precedence over individual considerations.

6. In securing recruits for our colony I will recommend only such as will prove desirable members and will avoid those who might, in any way, hinder the success of our movement."

I will state my reasons for suggesting irrigated land for our colony to settle on in preference to land dependent on rainfall:

1. Irrigated land is many times more productive and sure of returns. The irrigator can calculate almost with certainty on fair returns for his labor, while the farmer dependent on the rainfall has to wait until the thresher tells the tale to know whether his year's operations have yielded him a living or resulted in heavy losses.

2. Less capital is required to start with.

3. It takes less time to bring land to the producing stage.

4. Much of the heavy work and drudgery of ordinary farming is not met with in irrigation culture.

5. The localities where irrigated lands are mostly located are remarkably healthful, being especially so to sufferers from consumption, catarrh and kindred diseases.

There are yet other weighty considerations which I will refer to when time and space permit. Very Respectfully,

J. HAMMOND, Member F. H. League.

WHY CALLED "FARMERS' HOMESEEKERS' LEAGUE."

Our title is not intended to convey the impression that only farmers are admitted to membership. It was adopted because the movement originated among men of that calling and it was decided that the policy of the League should be to see that the

colony contained a sufficient number of practical, experienced food-producers to preclude any possibility of failure through ignorance on the part of the colonists. In all probability we will welcome to our ranks a number from other walks of life. We will endeavor to find room for any man, whose superior intelligence and willingness to undergo the necessary training to fit him for the work, lead us to believe that he will prosper in a new home. We must also have among us a sufficient number of craftsmen to insure the comfort and prosperity of the colonists.

SHALL WE SEND OUT PIONEERS?

Let us assume that one colony consists of 500 able-bodied men, some of whom have families and some of whom not. Manifestly our best policy would be to send out the men unencumbered with families, to prepare the new homes for their future occupants, remunerating them, of course, for the work done on the property of their brothers who stay behind. These latter may decide to have this arrangement continue until their land is brought to the producing stage, in which case they need not give up their present means of livelihood until the land is capable of supporting them.

WHAT CAPITAL WILL BE REQUIRED?

Assuming, again, that our colony consists of 500 able-bodied men, of whom 200 go t as pioneers to prepare for each colonist (head of a family) 40 acres of land we may give, as a rough estimate, \$50,000 as the sum which will be required the first six months and a like amount the second six months, or an average of \$100 per colonist for each six months. The pioneers' portion of this amount being, of course, less than that of the other colonists. The expenditures for the first six months would include machinery for irrigating purposes, 250 horses and harnesses, farming implements, tools, etc., lumber for building houses for the pioneers, transportation expenses, young trees, seeds, etc., and the expense of maintaining 200 men for six months. For the second six months the expenditure would include the cost of material for the building of 500 small cottages, maintenance of 200 men for six months, seeds, trees, etc.

VALUE OF THE LAND AT THE END OF THE FIRST YEAR.

The probable value of the colony's property at the end of the first year would be 20,000 acres improved irrigated land, (partly under cultivation) consisting of 500 40-acre plats, each with small cottage thereon \$1,000,000, the original cost of which was \$200,000. The colony in addition to its land would have valuable assets consisting of an irrigation system, town site, irrigation machinery outfit, implements, horses, tools, etc., depreciated by one year's use.

SIZE OF LOTS.

The amount of land each colonist should hold is a matter of considerable importance. If the lots are too large, the colonists are so far apart that it tends to create that feeling of isolation, which to many people is the chief drawback to country life. It also is a temptation to the holder to attempt to cultivate more land than he can properly take care of, and in thus attempting to do too much he does none of it well. On the other hand a lot so small as to be insufficient for the support of a colonist's family is an evil equally to be avoided. Shall we put the amount of land at from 20 to 40 acres? Give us your opinions on this point. The Mormons have become a very prosperous community on 20-acre holdings while other colonies have adopted larger tracts.

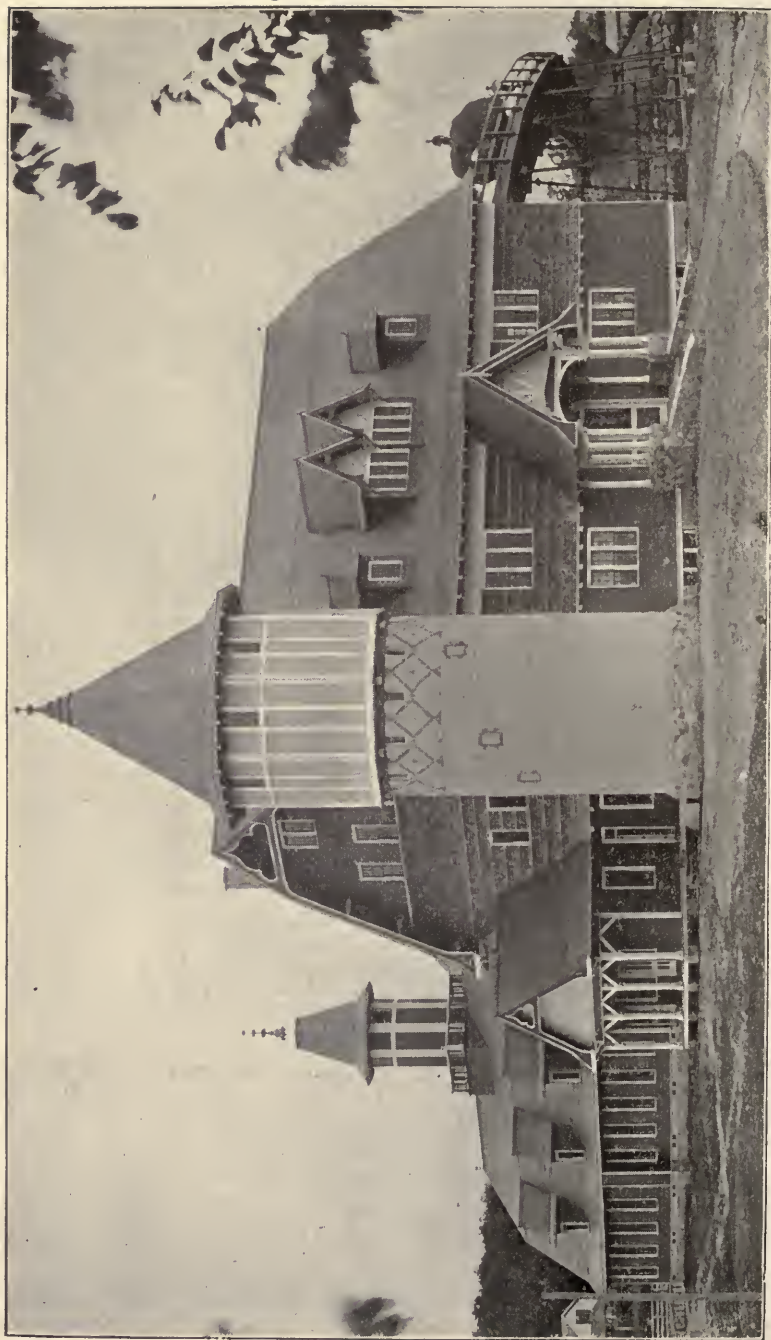
OPEN TO CRITICISM.

All our readers are invited to give their opinions on the above and a frank criticism of the ideas promulgated in the above paragraphs is desired. By giving us the benefit of your advice and experience the plans formed may result in placing the colony on a firm and sound basis.

WHERE SHALL WE SETTLE?

Should we succeed in securing the 500 members desired to which end we are striving, we will proceed to ascertain which of the western or southwestern states is sufficiently wide awake to offer us adequate inducements for settlement within its borders. No offer that does not include the following advantages will be entertained:

A tract of land free of charge, where an irrigation system can be easily and cheaply constructed, having fertile soil, favorable climate and railroad facilities within easy reach.



DAIRY BARN AND STOCK-JUDGING BUILDING, COLLEGE OF AGRICULTURE, UNIVERSITY OF WISCONSIN.

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs, Also sketches or plans of convenient and commodious barns hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us improve the appearance of THE AGE?

A MODEL BARN.

Few farmers can afford to have as complete and fine a dairy barn as the one in the accompanying illustration—that of

the barn was obtained. Our limited space has obliged us to condense the excellent article given by W. L. Carlyle, and also to omit some of the illustrations.

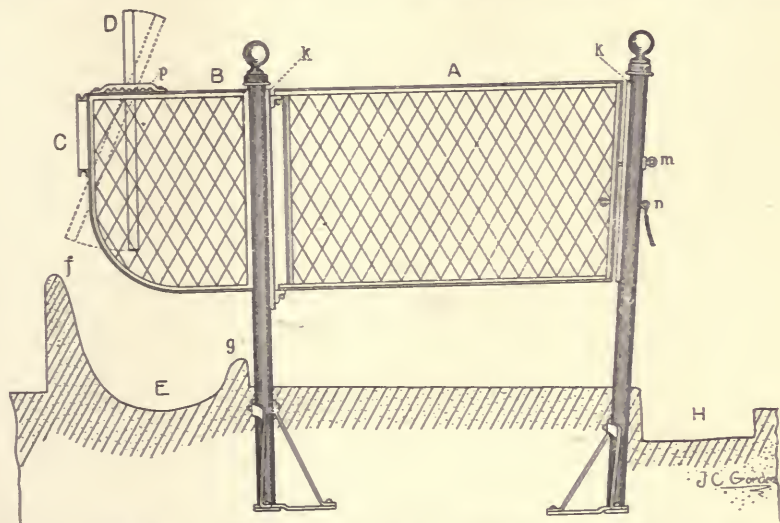


FIG. 1.—Cross-section of cow-stall and stable floor, showing location of manger and manure gutter. A, gate; B, front side panel; C, frame work supporting side panel; D, swinging panel; E, manger; f, g, sides of manger; H, manure gutter; k, k, gate bars; m, pin arranged with a spring for fastening gate; n, eye for chain; p, arrangement for moving swinging panel.

the College of Agriculture, University of Wisconsin—but from a description of it an idea may be gained of the progress made by dairymen, and valuable hints derived which may be put to practical use when building a new barn. A brief mention was made last month of the Fifteenth Annual Report of the Wisconsin College, from which the following description of

We present those which we think will give the best idea of the interior arrangement of the stable. The cuts were loaned us through the kindness of Dean Henry and Prof. W. L. Carlyle.

The building, which is of frame, consists of the barn proper, 86 feet long by 50 feet wide, with two wings, each 70 feet long, projecting at right angles from each

end of the main building. A large classroom is located between the two wings. The main building is three stories high and the wings two stories. The material

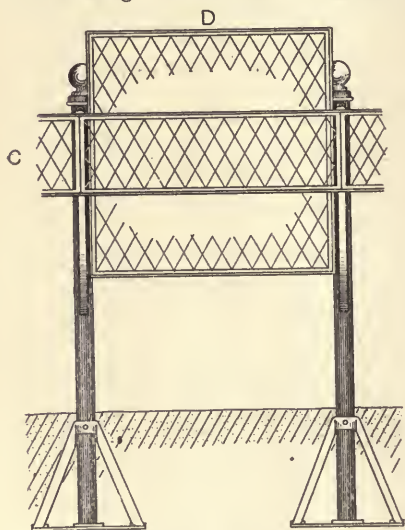


FIG. 2.—Front view of cow stall.

for filling the silo, the hay bays, and the straw for bedding, as well as the grain, is taken into the top floor, a steel trestle of moderate grade leading up to it, as shown

second floor may be termed a "store room" for feed, etc., while the main floor is taken up by the milk room, herdsman's room, hospital for the stock, etc.

The cow stable proper, to which we wish to call especial attention, is located in the left wing of the barn. It is 40 by 70 feet lined throughout with corrugated galvanized sheeting, and as the walls and ceilings can thus be washed whenever necessary with a hose and scrub brush, perfect cleanliness is insured. The floor is of Portland cement and crushed granite, with a slightly sloping surface, leading all water used in washing and scrubbing to the sewer drains.

Fig. 1 shows a cross section of the floor and mangers of the stable. The mangers are built up from and composed of the same material as the floor. The manure gutters behind the cows are 16 inches wide and slope toward the center of the stable where a trap can be opened connecting with a sewer to be used only in flushing out the stable with water. The manger is so arranged as to be used for watering as well as feeding. The water

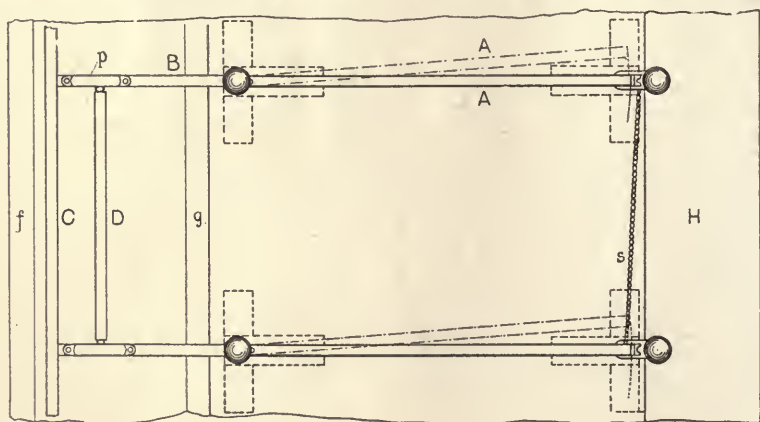


Fig. 3.—Plan of cow stall.

in the illustration. A wagon scale is located at the entrance, so that everything may be weighed, and the ensilage and fodder cutter are also on this floor. By trap doors and a little machinery the ensilage is dropped into the silo, the cut food, grain and bedding to the lower floors. The

flows into the manger at either end from a pipe, and can be drained into the sewer by removing a valve, as the mangers, too, slope slightly toward the center. The barn is arranged for thirty-six cows, with the two rows of stalls facing each other and a ten-foot passage between, wide

enough to admit of a team being driven through. The stalls are constructed of gas pipe posts with frame-work of gates

that the droppings are received into the manure gutter and not on the floor of the stall. The side panels of the stalls are

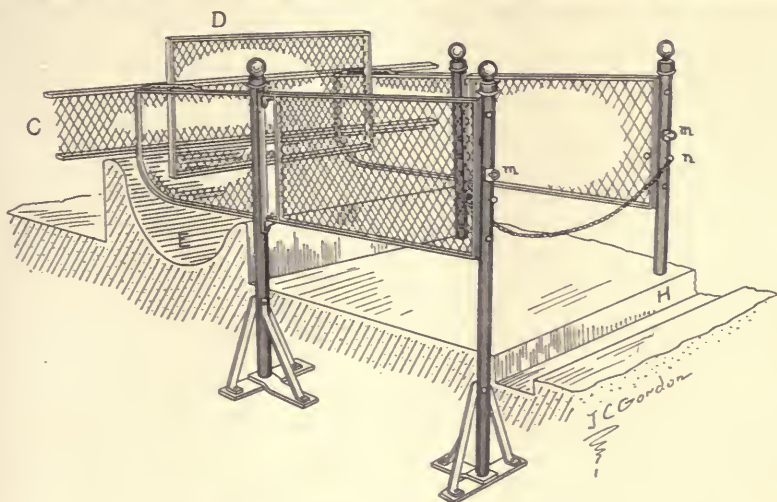


Fig. 4.—Perspective view of improved cow stall.

and panels of channel-iron supporting a mesh of No. 7 woven wire. (Figs. 2, 3 and 4.

The figures show how the posts are anchored in a cement foundation. The letter C indicates the frame-work extend-

hinged to accommodate the milkers and allow the cows to pass out without backing over the manure gutter.

The stable for young stock consists of an arrangement of stanchions and mangers similar to that of Fig. 5, which is a bull

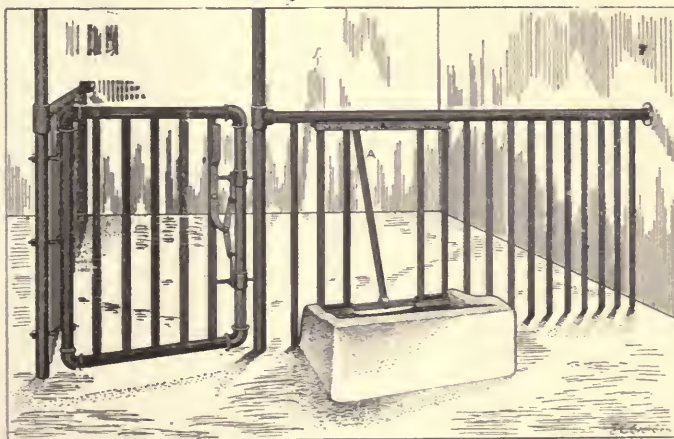


Fig. 5.—Perspective view of bull stall, showing gate and stanchion.

ing the length of each row of stalls to support the front part of the side panels and give them rigidity. D indicates the swinging panel which may be moved (see P) to suit the length of the cow, forcing a small cow to stand well back in her stall

stall, with the exception that the bars and gates are not so heavy as those of the latter.

The whole makes up a stable which, in point of cleanliness, ventilation and general sanitary arrangements, far excels many dwelling houses.

A DIFFERENCE OF OPINION.

WALLULA, WASH., Feb. 15, 1899.
EDITOR IRRIGATION AGE:

Dear Sir:—I saw an article in the February number that is so at variance with years of observation and experience that I cannot help calling your attention to it. The writer says: "There is no kind of culture that can compare with horticulture in this particular of appropriating water, except cow culture. Milk is also mainly water, but wet as milk is, it contains more dry matter than an equal weight of plums, gooseberries or turnips. And there is this difference between milk and fruits: the more water milk has in it the poorer the milk is; the more water you can get into fruits the better they are." This may be a fact in Kansas but it is not so in the far West.

I have seen fruit ruined by over watering. You can injure the color of phecaes by over-irrigating. I speak of peaches because they have been my specialty. I have seen many hundreds of sacks of potatoes ruined by over-irrigation. It is a science not easily learned—to know when you have irrigated them just enough; it can be learned only by careful observation and experience. Porous soil can be irrigated with more impunity, with less danger of injuring the crop than compact soil.

I am aware that milk can be ruined by over-watering, in fact I am not sure that water, when put in the richest of milk helps it in the least, while water on some soils when applied in large quantities, will make an almost unrecognizable change in color, size and flavor in both fruits and vegetables. But do not deceive yourselves and think because water is a good thing for all crops that you cannot overdo it. If your conditions are like they are in the West, over-watering will make your potatoes soggy, your fruit sour and insipid.

I once shipped a carload of watermelons to Helena, Montana. After I had made arrangements with the commission merchant to handle my melons, I told him I had forty boxes of peaches and

wanted to know what he would give me for them. He said, "I wish you would see if you can't dispose of them to some retail dealer; they would have to be of better quality than I have seen from your state if I could afford to give you more than 45 or 50 cents per box." He took me around to see his fine California peaches. "Now see how large and fine those are; try them; all in fine condition. Peaches from your state do not stand up well. Aint those fine?" I replied, "Yes, sir, you have fine looking peaches, but that is all. I offer you a real peach." He asked what I meant. "Sir, when you eat one of my peaches you want another and another, until your hunger for peaches is satisfied. One or two is all you want of this kind."

A few hours later my peaches arrived. After examining them he said: "I will give you 80 cents per box." "Raise her 5 cents and they are yours," and they sold at 85. He said they had the finest flavor of any he had tasted since he had been in the commission business.

Those peaches were raised on sub-irrigated land. The river is the highest about the 20th of June. I do not believe any kind of irrigation is so good as this, although I have had one or two crops that were not good on account of the river remaining up too long, and I think they were not cultivated enough. I have land that the river does effect, that I hope some day to irrigate by steam or current wheel. In this I shall have much to learn as my soil differs greatly from other irrigated land near me. Yours respectfully,

T. B. H.

ACTIVE SOLICITORS WANTED EVERY-
where for "The Story of the Philippines," by Murat Halstead, commissioned by the Government as Official Historian to the War Department. This book was written in army camps at San Francisco, on the Pacific with General Merritt, in the hospitals at Honolulu, in Hong Kong, in the American trenches at Manila, in the insurgent camps with Aguinaldo, on the deck of the Olympia with Dewey, and in the roar of battle at the fall of Manila. Bonanza for agents. Brimful of original pictures taken by government photographers on the spot. Large hook. Low prices. Big profits. Freight paid. Credit given. Drop all trashy unofficial war books. Outfit free. Address, H. L. Barber, Gen. Mng'r., 356 Dearborn Street, Chicago.

PULSE OF THE IRRIGATION INDUSTRY.

SENATOR WARREN'S WORK.

In the late sessions of Congress Senator Warren, of Wyoming, made an eloquent plea for the desired appropriation of \$35,000 for irrigation investigation. In his opinion it was the most important in the entire bill. He said:—

"This is not a local proposition nor a local want in a narrow sense, nor is it narrow in any sense. It is a very broad subject and a burning one with many people and localities. It is fallacious to think it applies to only the strictly arid region. Irrigation will benefit all parts of the country, each and every state in the union, if only a knowledge of its application and benefits be properly disseminated. I do not think I overstate its value when I say that irrigation and reclamation of land is the most important economical subject or problem that we have before us today and capable of yielding the largest returns to us as a people for the expense of providing for and prosecuting vigorously this department work. It is a national want more than a state or individual one, the nation at large being the great beneficiary from every point of view.

* * * *

The United States owns exclusive of Alaska, about 700,000,000 acres of public land, about 550,000,000 acres of which is arid and practically useless except as to some portions which furnish very thin grazing. To apply the waters of the streams to the lands and to impound and use the storm waters intelligently upon these arid wastes is practically to create land, and of the most valuable character."

Later on, in referring to the value of the land he said:—

"The value of irrigable and irrigated lands and irrigation water depends upon wise laws governing the ownership and distribution of water, a knowledge of the

best assimilation of land and water, and its power and adaptability with reference to the different agricultural crops. The Secretary of Agriculture says, in speaking of irrigation, in his last annual report:

Unfortunately, the accurate information on which alone intelligent reforms can be based is almost wholly lacking. As the problems which confront these communities are, in a general way, the same, and in many particulars affect the national as well as local interests, it is highly appropriate that the National Government should undertake investigations to aid in the solution of the problems of irrigation. As many of these problems are directly connected with those in other agricultural lines in which the department and the experiment stations are working it is my judgment that this department should be put in a position to efficiently organize and conduct important investigations in this line.

A noted and most competent expert in irrigation, Prof. Elwood Mead, State engineer of Wyoming, in speaking of this department work, says:

It is the purpose of this investigation to aid the state irrigation authorities in their work of framing and enforcing laws for the distribution and beneficial use of the rivers of the arid region: to help farmers in their efforts to secure the conservation and best use of that supply, and to collect and arrange the facts which will tend to promote wise legislation by Congress for the reclamation or disposal of the remainder of the public domain.

The same author further says:

The history of all irrigated countries show that wise laws do more for the prosperity of their farmers than a fertile soil or abundant water supply. The settlement of the arid West, the separation of single drainage areas into different political divisions, and the necessity of framing laws to meet emergencies before experience or study had shown what those laws should embrace have created industrial and legal complications which threatened the stability and value of the irrigated farms, and whose solution will require all the wisdom and patience of our ablest minds. The investigation of institutions

inaugurated by the department is destined, I am confident, to mark a new and better era of irrigation development for the arid states."

MR. NEWELL'S REPORT.

In response to the resolution passed by the Senate Feb. 7,

Resolved, That the Secretary of the Interior be and hereby is, directed to furnish in concise form for the use of the Senate a general statement of the origin, character and extent of the surveys of reservoir sites made by the United States Geological Survey, with brief memoranda as to present conditions of water storage and the most important sites in each large hydrographic basin, also a summary of estimates as to probable cost of constructing suitable dams at points where the stored water will be of most immediate value to the public.

Secretary of the Interior, C. N. Bliss, presented the report prepared by Mr. F. H. Newell, hydrographer, entitled "Surveys of Reservoir Sites," which is valuable for reference as well as interesting to all who are in sympathy with the irrigation movement. Mr. Newell's report traces the work of the government surveys from the report prepared by Maj. J. W. Powell, April 1, 1878, on the "Lands of the Arid Region," to the investigations of recent times. A history of the extent and character of the surveys is given, with a discussion of the present conditions, requisites for success, and important reservoir sites. In speaking of the present conditions Mr. Newell says:

"One fact has come prominently forward during the last ten years, since the inauguration of the reservoir work, and that is that water storage on a large scale can rarely be made profitable to individuals or corporations. Water conservation is expensive at best, and existing conditions, laws, and customs are such that the person who builds a dam on the head waters of a stream is rarely in a position to be benefited financially by the water which he impounds. * * * While reservoirs in general cannot be made sources of profit to the investors, there is no gainsaying the fact that they are indispensable to the community. They may be classed with light-houses and works of internal improvement, which, under existing laws and customs, can not be made

sources of private gain, and yet must be had if a full development of the natural resources is to be obtained.

The one great demand of the western half of the United States is for more water during times of scarcity. This has been particularly accentuated by the droughts of 1898, when millions of dollars were lost through lack of ordinary supply. It is highly probable that the aggregate losses to the communities, if these could have been put in the form of works for conserving flood water, would have repaid the cost of all such works. Such losses are so distributed and so far-reaching that it is, of course, impossible to segregate them, or to indicate definitely the individuals most deeply concerned. They are, moreover, of such character that only the community as a whole is competent to guard against them, individual, or even corporate action, not being possible. The state or the nation must provide the means by which disasters of this kind may in the future be avoided. Ten years ago it was commonly asserted that every acre of the arid land could be reclaimed. Now there is no longer talk of irrigating every acre of the fertile lands of the arid region, and comparatively little interest is displayed as to whether 10 or 15 per cent of these lands can be reclaimed. Public sentiment is now concentrated on the question how the relatively small quantity of water can be conserved for the largest use, it being apparent that by such conservation a population of many million can be directly or indirectly sustained."

ACTIVE SOLICITORS WANTED EVERY- where for "The Story of the Philippines," by Murat Halstead, commissioned by the Government as Official Historian to the War Department. The book was written in army camps at San Francisco, on the Pacific with General Merritt, in the hospitals at Honolulu, in Hong Kong, in the American trenches at Manila, in the insurgent camps with Aguinaldo, on the deck of the Olympia with Dewey, and in the roar of battle at the fall of Manila. Bonanza for agents. Brimful of original pictures taken by government photographers on the spot. Large book. Low prices. Big profits. Freight paid. Credit given. Drop all trashy unofficial war books. Outfit free. Address, H. L. Barber, Gen. Mngr., 356 Dearborn Street, Chicago.

WITH OUR EXCHANGES.

SCRIBNER'S.

W. J. Henderson, whose family have long been in the business of managing theatres, writes for the March *Scribner's* a very clear account of "The Business of a Theatre," unfolding that side of theatrical affairs of which the public is profoundly ignorant.

Jesse Lynch Williams, whose newspaper stories have made a success, contributes the famous tale of the "Cub Reporter," who had been a half-back and stirs up his college to burn the King of Spain in effigy, and Albert White Vorse introduces to us a new field of fiction in the story about the Eskimos. Senator Hoar's Reminiscences give an important and hitherto unpublished letter of Daniel Webster, regarding slavery.

In his "Search-Light Letters" Robert Grant speaks of the growing snobbism of Americans, "the appetite for social tittle-tattle," displayed by the poor who desire to hear what the wealthy class do and say. He says: "But this is not the spirit of the United States, nor are these the best Americans. Our nation is strange in this respect. We wear our faults upon our sleeves, or rather we suffer a surface population to belie us in various walks of life. That is the reason why the foreigners who come over here and try to amass the materials for a book in a few months fail to understand us as we really are. They are led by superficially prominent indications to believe many things which are true only of a limited portion of the population, and they fail to perceive the sturdiness of character, the independence of view, and the social charm which distinguishes a large and constantly increasing portion of the American people, who are neither extravagant plutocrats nor vulgar republican braggarts and despisers of civilized practices."

The little booklet of the Frank B. White Company, February issue, is of neat and

attractive appearance, and to us of especial interest, due no doubt to the kindly mention given the AGE.

LADIES' HOME JOURNAL.

Despite his dislike to be photographed, Pope Leo XIII has permitted himself to be pictured by the Biograph, and a number of the most interesting portraits are found in the March issue. They show the venerable Pontiff in the grounds of the Vatican, passing along his favorite walks and drives, attended by his secretary, guards, or members of his household. The pictures are exceedingly interesting in showing the Pope as he lives at the Vatican, and his surroundings, and are doubly valuable because they are the first pictures that have been made of the Pope in a great many years.

"What it means to be a Wife," by Helen Watterson Moody, is one of those common-sense articles that it does one good to read. She does not give any rules on "how to manage a husband" as she claims (with truth) that a man who can be managed is not worth writing about.

MCCLURE'S MAGAZINE.

The March *McClure's* is an unusually good number of a magazine that never fails to supply something out of the ordinary. An account of Tripler's invention and process for reducing ordinary air to a liquid of such wondrous potency that it may displace steam and electricity and supply, at next to no cost, all the force required in all the mechanical operations of life, brings us to the "edge of the future" with a sweep that takes one's breath. Somewhat the same palpitant expectancy is raised by Lieutenant Peary's account of his plans and hopes for the new exploration for the North Pole, in the prosecution of which he is now established somewhere in the vicinity of Lincoln Sea, 82 or 83 degrees north latitude. No less interesting

in their several ways, and scarcely less striking, are a series of "Sketches in Egypt," drawn by Charles Dana Gibson, with some genial comment and description written by the artist himself; some entirely new reminiscences of Lincoln, showing his relations with Fremont, McClellan, Cameron, and Stanton, and illustrating his rare tact and consideration in dealing with men in general; an account (largely his own narrative) of the way in which the artist Tissot came to take up his great work of picturing the life of Christ, and of the manner in which he executed it; and incidents and anecdotes of General Wood's great work in the regeneration of Santiago, furnished by H. H. Lewis, who himself spent sometime at Santiago with General Wood. All of these articles are fully illustrated, the one on Tissot with some beautiful reproductions of the chief of his paintings. Captain Mahan, in his series of papers "The War on the Sea and its Lessons," sets forth in this number the problems presented to the navy by the arrival of Cervera in West Indian waters, and relates how they were dealt with. Mr. Kipling gives us a further chapter from the adventures of "Stalky & Co.," one that shows those heroes in quite a new role; and there are several other good short stories in the number.

THE FORUM.

To say that the March number is an unusually good one is great praise, as this publication is one of such high order that each issue is full of timely and interesting articles by writers of ability and experience. Mark Twain contributes an article full of his old-time humor. Taking for his text "Diplomatic Pay and Clothes," he discourses, in terms of withering satire, on the meagreness of the stipends which we pay to our diplomatic representatives abroad. He also ridicules, in his unique style of pleasantry, the absence of an official court dress, which, unless our minister happen to have been in the army or navy, compels him to attend court and public functions, "even at seven in the morning, in that same old funny swallow-tail. * * * It is a night-dress and a night-dress only,—a night-shirt is not

more so. Yet when our representative makes an official visit in the morning, he is obliged to go in that night-dress. It makes the very cab horses laugh."

"A Lost Eden—Cuba" is the expressive title of an article by Dr. Felix L. Oswald. "The coasts of Cuba," he says, seem to have been constructed for the special convenience of filibustering expeditions." It will be many years before the desperadoes and outlaws of Cuba become peaceful, law-abiding citizens and, despite the fact that "the undulations of the coast-plain will soon resemble a wide-spread sea of verdure," the writer thinks "for the interests of American civilization it would perhaps have been better if, like the lost Atlantis, the whole island had disappeared beneath the ocean wave." Col. Alexander S. Bacon, in his article, "Is our Army Degenerate?" compares the success of our naval engagements during the late war with the disgraceful record of our army management. Lack of proper military training was, he thinks, in a great measure to blame for the mistakes which were made, and he says truly. "It is worse than a blunder, it is, as I have said, a crime, to put thousands of precious lives under the control of an uneducated soldier, no matter how experienced and efficient as a subaltern." From undisciplined and raw recruits a magnificent army may be made, but the officers must be men who are heroic; who have sufficient enthusiasm to inspire their men and who, in addition to having brains, must have training and experience. While our army is not as a whole degenerate, it will not bear comparison to our navy.

Hon. Charles Denby, who has been appointed a member of the commission to the Philippines, contributed an article entitled "What shall we do with the Philippines," which was brought to a somewhat abrupt close by the fact that, having been appointed on the commission, he felt he was not at liberty to express opinions on a vital question of this nature, which before he could discuss at his pleasure.

Since our last issue we received a "harbinger of spring" in the shape of a package of flower and vegetable seeds from the D. M. Ferry Seed Co., of Detroit

ODDS AND ENDS.

WATERING TREES IN AUTUMN.

Perhaps many will think that the fall of the year is not the proper time to water trees, but the fact is it is much more important that orchard land should be thoroughly flooded during autumn than at any other season, especially if the latter part of the summer and early autumn has been extremely dry, says the *Orange Judd Farmer*. If the ground is allowed to freeze about the trees without the application of moisture, the chances are life will be extinct by the following spring. There is a great deal of talk about dry summers killing ornamental and fruit trees. In my opinion it is not the dry summer, but the lack of moisture just before the ground freezes. This being the case late autumn is the time to water, and by so doing the trees will come out in good shape in the spring and make a satisfactory growth. If allowed to freeze up dry, the severe cold during the winter impoverishes the trees, and next spring they are puny and sickly, with not sufficient vitality left to carry them through the summer.

The best way to apply the water with the least waste is to select a solid stick of timber two feet long and about four inches in diameter and sharpen one end to a point tapering back to within six inches of the top. Drive this down about 18 inches close to the main root of the tree. Remove it and fill the hole with water. Repeat every evening until the roots are thoroughly soaked. The hole should be covered with a stone to prevent evaporation and filling up. After the process is completed fill the hole up with earth. The best time for doing this work is the latter part of October or the first

week in November. This may seem like a great deal of work, but it is better to do this than to see groves and orchards die.

ADVANTAGES OF DIRECT BUYING.

New innovations do not as a rule meet with prompt public approval. While the American people are famous all around the world for their business acumen and general aptitude to think out and bring into action new invention and new methods, we often show a disposition of positive lethargy when it comes to changing so-called fixed principles and methods.

Certain manufacturing institutions have in recent years inaugurated a new system of disposing of their products which is unqualifiedly to the advantage of the consumer. It took courage to make the change, but they did it. Among the pioneers in this new method of doing business was the Elkhart Carriage & Harness Mfg. Co., of Elkhart, Indiana, whose ad. appears on page 221 of this issue. These people began this plan of doing business twenty-six years ago and have adhered to it strictly ever since. The result has been so entirely successful that they are today the largest manufacturers of carriages and harness in the world selling to the consumer exclusively.

The advantages to the consumer are almost beyond estimate. He gets better goods; better and larger selection; better styles and finish and finally he buys at a much more equitable and advantageous price. In dealing with the Elkhart people there is no risk to assume as they ship either vehicles or harness anywhere for examination and guarantee every article they manufacture and sell. Then, too, one may deal satisfactorily from any distance. The Elkhart Carriage & Harness Mfg. Co., publish an extended illustrated catalogue, which they take pleasure in mailing to all our readers who request it.

THE IRRIGATION AGE.

AN ILLUSTRATED MONTHLY.

Entered at the Post Office at Chicago, Ill., as second-class matter.

THE IRRIGATION AGE is a Journal of Western America, recognized throughout the World as the exponent of Irrigation and its kindred industries. It is the pioneer journal of its kind in the world and has no rival in half a continent. It advocates the mineral development and the industrial growth of the West.

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J. E. FORREST, Publisher.

916 W. Harrison Street,

CHICAGO.

L. R. WING Editor



THE YELLOW STONE VALLEY FROM THE BLUFF OVERLOOKING THE TOWN OF BILLINGS—Whitney, Bul 14, Div. of Soils, Dept. of Agri.

THE IRRIGATION AGE.

VOL. XIII.

CHICAGO, APRIL 1899.

NO. 7.

THE PROGRESS OF WESTERN AMERICA.

A Breed of Men.

Speaking of the Progress of Western America, we must not overlook the fact to which that progress is true. It is solely to the kind of men the west breeds, self-reliant, adaptable, big physically, morally, mentally, and every other way. This characteristic "bigness" is nothing to be surprised at. The west is a land of big things—big lakes, big prairies, big mountains, big rivers, etc. It would be surprising, indeed, if such environments should fail to produce big men.

What a glorious record the men of the west are making to day in the far east. They are bearing the brunt of the war in the Philippines. Their dash, energy and efficiency is permeating the old world with a healthy respect for the American citizen soldier. Their actions may not be characterized by the machine-like precision of Uncle Sam's regulars. Perhaps they make much more noise when charging the enemy than is called for by army regulations. Their knowledge of the science of warfare may be limited to the desire to get within fighting reach of the enemy and then annihilate him. But do you notice how they "get there?" Nothing can stop them.

So long as Uncle Sam can breed such lusty nephews in his western territory so long will he never lack sufficient intelligent soldiery to hold his own against the combined strength of foreign rivals. The "military geniuses" of Europe, bred in the atmosphere of an "I am better than thou" society, tell us that it requires a year or

two to whip raw recruits into shape. They overlook the fact that the armies of Europe are recruited from the ranks of the incapables, whereas the American Volunteer is an intelligent unit who knows what he has to fight with, fights because he wants to, and when the fighting is over is ready for anything that "turns up."

All of which inevitably suggests the moral that your Uncle Samuel has no use for a large standing army. If anybody says we do he is either a traitor or a coward.

We recently received the January, February and March numbers of *The Forester*, the official organ of the American Forestry Association. We should be glad to welcome so neat and attractive a magazine even were its aims entirely apart from ours, but our fields are so closely allied that we are still more pleased to number it among our exchanges. Irrigation and forestry should go hand in hand, for our mighty forest growths conserve the moisture which would otherwise run to waste, if it did not do positive damage. Where ever you find a treeless section of country there you find an arid or semi-arid region, whose slight rainfall runs off the barren hills, scarcely moistening the under surface. While in a country thickly grown with woods the rain is "caught," as we might say, by the leaves, branches and roots of the trees, sinks into the earth, to reappear later on in a trickling spring which helps to swell a river. India and Germany are two countries that have rec-

ognized the value of tree planting and forest preservation and in the latter country the wanton destruction of a tree brings swift punishment. An Australian writer in commenting upon this says: "In most countries that are noted for successful forestry, the enterprise has been undertaken simply to grow the timber and sell it. Some countries, however, have regarded this as a secondary consideration. The forests have been planted to check floods, and to turn deserts into grazing and farming areas by attracting rain and moisture. In India, where deserts have been turned into forests, some districts have been rendered free from most devastating floods through the foliage and undergrowth retarding the rush of the water, and allowing it time to soak into the ground."

As the value of trees, then, is so fully understood it is but natural that those interested in the irrigation industry should welcome a movement so beneficial to their interests as that of the forestry association.

To *The Forester* we extend the right hand of fellowship and wish it, and the association of which it is the official organ, the success so good a cause deserves.

To Banish Loneliness.

The great drawback to farm life in the estimation of many is its loneliness. To live miles from town and possibly be prevented from exchanging visits with neighbors by bad roads, is certainly a drawback to rural life. Few persons are so self-sufficient as to be able to live without the companionship of their fellows for any length of time.

In certain sections this condition is remedied by the telephone. It is in most successful operation in Geauga county, Ohio, where telephone wires are strung throughout sixteen counties. The leading telephone company is the Bainbridge, which was organized by eight farmers. They formed a stock company and began putting in 'phones which have given general satisfaction. The cost of one mile of this system was about \$51.50, the stockholders doing a great share of the labor.

Aside from the commercial value the telephone is to the farmer, the social side is well worth considering. If the men are too busy to spare the team, the "women

folks" can have a good visit over the 'phone; Mrs. Smith can tell Mrs. Jones that the baby has a tooth, and the latter can obtain a recipe for angel-food cake or brown bread without leaving her own home. In case of sickness, death or accident how invaluable it would be! When a man is injured by the mower, or thrashing machine how handy it would be to run to the telephone and call for the doctor. The success of the system in Ohio should recommend it favorably.

The Associated Colonies.

Recently we received the little booklet of the "Associated Colonies," 42 Union Square, New York, of which Wm. E. Smythe, former editor of the AGE, is president. The Associated Colonies is a corporation under the laws of New York which is actively engaged in colonizing the arid region of the United States. Its land lies along the Pacific coast and elsewhere, but principally in Honey Lake Valley, Cal. To place the surplus population of the East upon the surplus land of the West is the work being done by the Colonies on the co-operative investment and co-operative settlement plan which has already proven a success in certain sections of Great Britain and the United States. The principles of the Colonies are similar to those of building and loan associations but the investment, it is claimed, is even safer than the former as irrigated land is the basis of security. "There is no sounder security than fertile irrigated land with an industrious man upon it engaged in diversified production under skilled direction."

Persons desirous of becoming co-operative colonists must subscribe for an amount of bonds sufficient, at maturity, to pay for their colony home and its improvements. As in the case of building and loan associations only a nominal amount is required to be paid upon the bonds for the person to become entitled to the advantages and enjoyments of the colony opportunities.

The self styled patriots, calling themselves the Cuban **Points to Annexation.** Assembly, is an educational body. They are such by an act of providence, and not because they care a continental for the education of anybody. We

have always held that the illegitimate offspring of a Spanish bushwacker and a negress is no lover of republican institutions. He is an irresponsible combination of sentiment, cupidity and blood-thirstiness. That is the lesson the Cuban Assembly, and the Cuban situation generally, is teaching Uncle Samuel. Annexation is the only proper solution, and at no distant date it will be demanded by the more enlightened among the Cubans.

The Little Red School-house.

Heredity vs. environment is still a debated question—whether the former decides the mental and moral status of the child or whether it is determined by the latter is discussed by laymen as well as physicians. While the environment and training of a child may not eradicate the evils it inherits from generations of ancestors, it will certainly correct and modify these evils to no small degree and the benefit of good surroundings and training no one can deny. Admitting this fact, then, we must also admit that whatever tends to beautify and brighten a child's surroundings is a strong factor for good. Those of us who attended public school in a cheerless barn-like building with nothing about it either beautiful or interesting; surrounded by a barren yard destitute of trees or shrubs, upon which the summer sun beat with a fierceness that made us, in our brief play-spells there, think of the deserts of our Geography lessons; we, who recall such youthful surroundings, will read with sympathetic interest the little pamphlet gotten out by the experiment station of Ithaca, N. Y., entitled "Hints on Rural School Grounds." "The Report of the Committee of Twelve" of the Educational Association, of 1897, says: "The rural schoolhouse, generally speaking, in its character and surroundings, is depressing and degrading. There is nothing about it calculated to cultivate a taste for the beautiful in art or nature.

If children are daily surrounded by those influences that elevate them, that make them clean and well-ordered, that make them love flowers, and pictures, and proper decorations, they at last reach that degree of culture where nothing else will please them. When they grow up and have homes of their own, they must have

them clean, neat, bright with pictures and fringed with shade trees and flowers."

The pamphlet gives several illustrations of school houses and surroundings, one of which, (a school house in eastern New York) is located in a grave yard. The writer, L. H. Bailey, says we ought not to blame children for playing truant if they are sent to such a place. There are also illustrations showing how much improvement might be made in the appearance of both buildings and grounds by the expenditure of a little work and money. The cost would be practically the same for a school house of attractive shape and proportion, as it would for the usual box-like structure built on a stereotyped pattern.

In his plan for a reform of these defects, Mr. Bailey assumes that in every rural district there can be found one person who is desirous of bettering existing conditions, and he suggests that this man call a meeting and bring the subject of improving the school grounds before the patrons of the school house. If he can succeed in arousing interest in the subject, as he doubtless can, different ones can easily be persuaded to give their aid, which will mean only a little labor on their part. Let one man do the plowing, another the repairing of the fence, another haul the trees and shrubs to be planted and in one day, by this method the beginning may be made. To keep up the improvement will require but little attention and work.

This is a brief outline of Mr. Bailey's plan and he would be glad to correspond with any one who is interested in this matter.

Beating Swords into Plough Shares.

Sometime ago, when certain "little Englander politicians" doubted the practicability of the home rule for Ireland, Cecil Rhodes, the "uncrowned king of Africa," bade them look to America for a successful demonstration of the principle the Irish race is contending for.

Just now our attention is called to still another matter which goes to prove that the eyes of the world are turned on America whenever it is at a loss for practical reform measures. All the nations of the world envy us our agricultural development and the high standard of agricultural intelligence which has made it pos-

sible, and they have gone to imitating our methods. In Russia, even, a hopeless theocracy of which the czar is god, they are planning for the organization and establishment of agricultural schools, and to induce the people to attend them they propose certain exemptions from military service. This is beating swords into plough shares with a vengeance. Surely the world is growing better and better every day.

Our Trade with Germany.

A good deal of unnecessary anxiety seems to be exhibited both in Germany and in the United States about the trade relations between the two countries. Some figures recently prepared by the Treasury Bureau of Statistics show that the supposition that American trade in Germany or German trade in America is being disturbed or depressed by existing conditions seems to be unfounded. Certainly the United States is giving to Germany a larger percentage of her import trade than ever before, and is selling to Germany a larger percentage of her exports than ever before. American exports to Germany increased over 11 per cent. in the last six months of 1898 compared with the corresponding six months of the preceding year, which of themselves were phenomenally large, and the imports from Germany into the United States for the same period were nearly 25 per cent. greater than those of the corresponding six months of last year. The share of our import trade given to Germany has steadily increased during the past decade, as has also the share which she takes of our exports. A decade ago 10 per cent. of our imports was taken from Germany, while now 13 per cent. comes from that country; a decade ago 8 per cent. of our exports went to Germany, now over 13 per cent. goes to that country.

A Victory for the People.

The recent elections in the east and in the middle west point to a healthy development of a sentiment in favor of public ownership of public utilities. As usual the Chicago city election attracted more than its proportionate share of attention. The re-election of Harrison to be Mayor of Chicago has demonstrated once more that the "machine" is losing its hold—

that adherence to well defined principles is rapidly superseding blind partisanship. The ideal democracy is becoming less of a dream every day.

We are **Conservative** "Trade the pup for a pig," says the *Farm Journal*. That is good advice. If you don't want a pig trade it for something which is less useless than a mongrel pup and more ornamental than a pig. We believe in being conservative in the advocacy of reforms.

Libby Prison Museum.

It is a matter of regret that the management of the Libby Prison Museum has been forced to do away with this picturesque reminder of war times. It was never a paying investment from the start and the wonder is that its supporters were willing to bear so long with a losing venture. Just why it was not more patronized would be hard to say; the location, possibly, had something to do with the non-success, it being so near the heart of the city that the ground upon which it stood was too valuable for such a purpose—or perhaps "too expensive" would be a better term than valuable, since no spot could be too valuable to bear this record of the country's suffering and achievements. Another drawback was its apparent permanence. Had the museum been established with a great display of red lettering to the effect that for a "limited time only could be seen," etc., etc., it would have been crowded. But we reasoned that "we could go to see it any time," just as we can the Masonic Temple or the Board of Trade; and "any time" means no time.

"Blessings brighten as they take their flight," and no sooner was it announced that "Libby Prison" was to be torn down, than the place was thronged. Possibly the fact that the *Tribune* gave tickets admitting the bearers free, was a strong inducement for people to attend, since humanity enjoys getting something for nothing. Thanks are due the *Tribune* for thus affording a great number, who would otherwise have missed it, the chance to see these records of our past as contained in the old prison.

Listening to the tales of suffering and privation which those walls had witnessed; looking upon the pictures of those who

have "gone before," and then turning to the crowds of merry sightseers, whose flippant remarks such as, "he ought to get a hair cut," referring to the portrait of a great commander in the civil war, one wondered what the thoughts must be of those who suffered agonies within those walls, if they were among the visitors. Could they realize that it was the same old building which held them prisoners, years ago?

It is to be hoped that a suitable location may be found upon which the prison may be permanently erected and become a fitting museum for the relics of our country's conflict.

Puerto Rico's Imports.

Under Spanish rule and the tariffs framed by Spain, Puerto Rico was practically compelled to buy most of her imports from Spain, the duties upon articles from other countries being so high as to give Spain a monopoly of the trade. On Feb. 1, '99, the manufacturers and merchants of the United States, for the first time, had equal access with other parts of the world to the markets of Puerto Rico, and the people of the island have now a chance to exercise their own judgment as to where and what they shall purchase. In the past few years their imports have ranged from twelve to fifteen million dollars' worth annually, the greater part of which was supplied by Spain. Statistics for the year 1896 (the latest available) show the Spanish imports received by Puerto Rico to have been greatest in the manufactured articles of cotton. Shoes and sandals come next in value. The imports of playing cards from Spain in '96 amounted to 69,085 pesetas, a peseta being equal in value to 19 $\frac{3}{4}$ cents of our money. As the natives become familiar with our national game of poker, this latter import will doubtless increase.

A Change of Heart.

Just a few short months ago there was a great hue and cry about the strained relations between this country and Germany. At the time of our late war it was even prophesied that the United States was stirring up a great brawl in which all the other powers would become leagued against the eagle and the lion. Instead, it seems to have cleared the atmosphere and Germany, for one, is disposed to smoke the

pipe of peace with not only Great Britain but the United States as well. While the lion and the lamb do not lie down together, all the animals have lost their desire to stir up the eagle, preferring to let that glorious bird alone.

As an earnest of the change undergone in Germany's feelings toward the two countries mentioned, the German Emperor received Mr. Cecil Rhodes at Berlin recently, and also sent inquiries as to Kipling's condition during his illness. Mr. Rhodes and Mr. Kipling represent English politics and English literature, two things which Germany has hitherto regarded with dislike.

The cartoonists picture Liberty on the mountain being tempted by Satan in the guise of Imperialism, who shows to the wavering damsel the world-wide empire, of which the Philippines are but a small part, which is to be hers if she will fall down and worship him.

The Anglo-Saxon Myth.

A great deal is being said and written now-a-days about "Anglo-Saxon supremacy." Anglo-Saxon rot! It is time that some impartial historian devotes his scholarship and his energy to relegate this absurd myth to the musty shelves of "forgotten lore." Who can read the stories of the successive invasions and colonizations of Britain by practically every race of Europe and intelligently maintain that the most boorish, the least intellectual and the most barbarous of these invading and colonizing tribes is entitled to the grotesque laudation which it receives at the hands of prejudiced and sycophantic historians and narrow gauge philosophers? The Anglo-Saxons were pirates, as treacherous, as superstitious, and as cruel and barbarous as any which cursed the world. We might as reasonably ascribe the supremacy of America today to the hypothesis that we are descendants of the Buccaneers that terrorized our coasts once upon a time.

In their own country these anglo saxons could not be distinguished from other dirty, ignorant, savage brawlers. In Britain they succeeded in terrorizing the coast people, as did our buccaneers of old, until they were driven inland by more intelligent invaders and lost their identity

and their faults by amalgamation with the more intelligent natives of the interior.

The English speaking people is a cosmopolite one.

Everything that is good is enduring. Everything that is evil perishes. It is the law of evolution, and the English speaking man in America, England, Africa, Australia, anywhere and everywhere you find him, is a living demonstration of this glorious truth. He is not the offspring of any marauding tribe. He is not the creature of environment. He is the embodiment of the best traits of all races and is superior to all environment. It is an insult to the Deity, who is no respecter of persons, to proclaim him a descendant of a certain thievish, ignorant, superstitious tribe which is obliterated and forgotten in its own bailiwick. Settle representatives of all nations in a desert island and let them intermarry, and in the

course of ages you will have the English speaking man, the lover of individual liberty, the friend of God. That's all there is to this so called "Anglo-Saxon" supremacy.

The greatest Englishman of the nineteenth century was a Jew!

The White Man's Burden. That famous author, Kipling, has had to bear his share

of the "white man's burden" recently, for certainly most of the "ills to which flesh is heir to" is a burden which the "white man" has inflicted upon himself by his reckless disregard of nature, a burden which his barbarous brother is remarkably free from.

The whole civilized world watched the progress of his disease, and his heroic battle with death, with much solicitude, and drew a deep breath of relief when it learned that he had conquered death.

IRRIGATION IN RHYME.

How dear to my heart is the prospect of riches,
When dizzy old age comes along by and by,
A farm in the west with a number of ditches,
And life would be one constant Fourth of July.

How sweet is the sound of swift flowing waters,
That course near the fields of alfalfa and oats,
A sod house to shelter my sons and my daughters,
A monster frame barn for the horses and colts.

Thus blessed in old age life would be worth living;
No failure of crops from the desolate drouth,
Each day would indeed be a day of thanksgiving;
A prayer in my heart and a song in my mouth.

The best thing I know of for saving the nation,
Is found in the creed of the people now here,
Whose motto is "ditching," whose pass "irrigation,"
Who stand up for water as some do for beer.

No more hot winds will sweep over the prairies
To wilt the potatoes and wither the rye,
When the people dig ditches from Dundy to Cherry,
And keep them bank full in the sweet bye and bye.

There'll be ample cause then for constant rejoicing,
When money is plenty and crops never fail,
For all will be happy and nobody voicing
The gruesome refrain of calamity's wail,

—*National Advocate.*

THE WATER DEVELOPMENT IN SOUTHERN CALIFORNIA.

ADDRESS BY T. S. VAN DYKE AT FARMERS' INSTITUTE, BURBANK, CAL. MARCH 29th.

The coming summer will see more water development south of Tehachipi than any two seasons of the past. Much of it will be solid and permanent addition to the resources of the section. Much more will be of merely temporary benefit but still well worth what it cost. Considerable more will represent disappointment either sooner or later. How to avoid loss of time and money is the principal question that is of much practical value and is also the hardest question to answer.

From the time when our mountains were several feet higher and the streams leading from their bases were several hundred feet below the present level of the wash and drift that has formed the soil of the valleys and slopes the streams have shifted their channels so many times that it is quite impossible to tell where they now are or what their number. Many are miles from the present bed of the stream while the chances are against any of them being exactly under the present bed because the range of most of the streams from side to side has been so wide.

Equally impossible is it to say how large they are or what the amount of water they carry or how long it will take it to run out if heavily drawn on. Some one has had the audacity to frame a formula for computing the flow of water under ground. But there is nothing in hydraulic engineering that justifies anything of the sort. In the dozens and even hundreds of old channels that the shifting of the streams and covering of the old beds with drift have made, the gravel or sand through which the water is now flowing, between two layers of clay or concrete, varies so much in the size of the grains, in the amount of fine material laying between the grains, as well as the character of the inlet and outlet to the sea that nothing approaching a rule should be given even if we knew the size of the channel and its exact slope. In short, the only way to develop water is to develop it.

There are however, certain principles to be borne in mind or you may find trouble ahead though it may not be immediate. First, all development is

DRAWING ON A RESERVOIR.

If you have an artesian well or one in which your water rises

much above the level on which it is first struck, you have a reservoir in which the dam is generally friction instead of masonry. But it is none the less a reservoir. Too many taps cannot be made in it nor can too many be left open. Much of the development made this year will represent pockets or channels of water connected with the source of supply by some small thread of gravel through which water moves very slowly. If exhausted it may take a long time after the next wet winter to fill them again. In many cases the very fact they are now full shows that they have no outlet to the sea. From this it is quite easy to understand how the inlet to them may be very small. For if it were very large the channel would probably go clear through to the ocean. The expression inexhaustable well has become quite common. But all wells are inexhaustable as long as you do not exhaust them. The test will come after many weeks, months or even years of pumping, when you have planted your orchard or alfalfa and expanded out on the strength of the new supply. Many developments will stand it but it is quite as certain that many more will not.

In case of wells, which will be the principal means of development, keep a careful record of the material passed through, so that you will know whether you are on gravel channel which is probably a stream or only in a sponge which will feed the well by seepage. Seepage is unreliable for heavy and continuous work. It may do for the windmill but generally the engine that is throwing much of a stream.

MUST BE ON AN UNDERGROUND STREAM

or a few weeks or even a few days may find the bottom of the well dry soon after the engine starts up. At first the well fills readily when pumped out but a cone of depression forms around it as soon as the pump begins. At first the sides of this are steep and when the pump stops the water soon fills it to the general level of the stratum of water in the sand or gravel. Day after day the edges of this cone spread farther away from the well, the slopes forming the sides become longer and more nearly a level. The water having farther to travel through resisting material comes in more slowly while the general level of the stratum of water is constantly falling to the level of the bottom of the pump. Once down there it may take several weeks, months or even years to fill again. The time cannot even be guessed at for you know nothing of the mode of supply and perhaps not even its source. Such is quite certain to be the case with wells sunk in decayed granite if a heavy draft is made on them. Even though the water comes in from crevices they cannot long be depended on.

THE PASSAGE OF WATER THROUGH FINE MATERIAL IS VERY SLOW.

You all know springs in the hills that flow without weakening for at least seven months after the last rain and yet where it is much

less than a quarter of a mile in any direction to the rim of the watershed from which you can readily see they must come. It is much the same and often worse with water passing through soil and even through pure sand it is provokingly slow. No one can calculate its rate of progress but you can generally rely upon its being provokingly slow when you need much water. If it were otherwise few of our water supplies would hold out after one dry year. People love to flatter themselves that the water comes from some distant source, independent of the watershed about the well. If in a well defined gravel channel this is generally the case and most wells in such formation are reliable under very heavy draft. But if in soil, or decayed rock the presumption is heavily the other way and even sand is often a mere sponge for a local watershed. Even where it is certain that it is not I have found the passage of water through it so slow that a well twenty feet across pumped down from eight feet to two feet took one hour to regain one foot with the water standing at the eight foot level all around it. This was a foot an hour under an average pressure of five and one-half feet. No one can say what it would have been under no pressure but with the grade of the stream twenty-five feet to the mile.

A mile and two thirds a year is quite slow under a pressure of five and a half feet.

EVEN FOR FINE QUICKSAND WHICH THIS WAS.

Yet I measured and timed this well myself as soon as the pump stopped and could not have made more than five per cent. error at the most. Through most sand water will pass more rapidly under that head yet you are liable at any time to be greatly disappointed in its velocity. Wells in soil, soft rock, and fine sand will do for a light supply and also to help out in bad seasons but should not be made a basis of farther expansion in planting until time has proved what they will do. The only danger in the present great developing movement is the cry Eureka. Too many may think they have solved the great problem only to find that what may be valuable as a reserve will not stand the brunt of steady battle.

Strange as it may seem a gravel channel in which the water does not rise in the pipe

MAY BE A MORE RELIABLE SOURCE OF SUPPLY

than one where it does. Where pressure is indicated by the rising of the water above the top of the stratum in which it is struck it means resistance all the way back to the last thread of water that feeds it below ground. If this resistance be removed by opening the channel by wells and drawing out the resisting water the supply is quite apt to come in much faster than when the resistance of the water below aided friction in holding it back. Consequently too many taps on an artesian belt may seriously reduce it by accelerating the feed of water

from above. But where there is no pressure the flow from above
CANNOT BE ACCELERATED BY TAPS BELOW.

There may be wells enough in it to take it all but they cannot hasten the end as in the other case. As this is contrary to common belief, even of many good engineers at first glance, you will find it of interest to consider this carefully especially in view of its possible importance.

In the case of Yarwood vs The West Los Angeles Water Company it was proved beyond question that the water in wells some twelve hundred feet above the development cut fell some four feet about the time the main cut was made and some sixteen inches while an extension was being made. This was not denied and could not be for I found on examination of the wells that it was true. But I was satisfied that it was from failure in the supply and not from the draft made by the cut. The other engineers in the case took the same view and the case was won by the company on that ground. Had the water been a still sheet it could have been lowered but in that case it would have been percolating water and the owner of the land, (the company) would have a right to it, even to the damage of another. To maintain their case plaintiffs had to claim as upper riparian owners on an underground stream and the court found that it was such a stream, although in the form of a moving sheet. But being in motion on a grade instead of standing on a level plane it became instantly subject to the laws of water flowing against resistance

WITHOUT REGARD TO ITS FORM, WIDTH, DEPTH, VELOCITY OR FALL.

One of the most simple of these is that water flowing against resistance will by that very resistance be held up to a certain plane. If so it cannot be lowered below that plane as long as the resistance is there. The illustration I gave in court was that of a flume carrying one hundred inches of water. It will flow full to a short distance from the end where it will drop off in a curve. This curve cannot be extended back of a certain point by any mode of facilitating the discharge. You may break off section after section or widen the outlet as you please but the curve quickly stops. No matter how short the flume you cannot carry it back the whole length, for if you could the flume would then carry more than the hundred inches. It would not be long enough to be a real flume.

Suppose now we fill the flume with gravel until it carries only one inch of water. We still have the same results. The curve at the end is changed some by the character of the resistance of the gravel but it is still there. The flume runs full as before to near the end and then curves suddenly off. By no way of assisting the discharge can you increase it so as to carry the curve back of the point where the nature of the resistance has located it. If such assistance could lower

it for the whole distance it would then carry more than one inch. But its capacity is now reduced to one inch by the resistance and that resistance necessarily holds the water up to the top of the flume.

You cannot avoid this conclusion except by jumping the terms of your own proposition. The consequence is that you cannot in this way reach the source and therefore

CANNOT LOWER ALL THE WATER PLANE AS LONG AS THE
SUPPLY LASTS.

The hydraulic curve formed by the lessening of the resistance at the end will vary with the character of the material, but in no case can it run back very far. In the Yarwood case we bored some fifty wells to test the theory, connected them all by the level and plotted the results. The curve ran out entirely in three hundred feet or over nine hundred feet below the land of the plaintiffs, showing that the lowering of the wells must have been due to failure of the supply far above. This was farther shown by the fact that the area over which the lowering occurred would have doubled the flow in the cut for several weeks had it all gone out that way. But there was no increase in the flow over that which continued for many months thereafter and the plaintiffs, though living where they could readily see and measure any such increase, did not attempt to show any. The sheet of water in this case rose again three hundred feet below the cut and moved on as if nothing had happened, the supply evidently coming up from below at that point.

The consequence is that several wells may be bored into such a stream not under pressure, and if not too close, so that one comes within the cone of depression formed by the other, each may get its share of the water without damage to the supply which would pass away to the sea if not thus taken. But if under pressure the same number of taps would probably increase the flow between the upper well and the mountains so as to let out the supply much faster. Thus a stream not under pressure may be a safer supply than one under pressure though it may cost more to raise the water.

Every kind of tunnel and opening out of a spring is only drawing on a reservoir. Anything more than absolutely necessary is dangerous waste. It is simply opening the gate too wide and leaving it open. In small ware sheds such development is apt to

FAIL ABOUT THE TIME YOU NEED IT MOST.

If you can dam up the tunnel and have it run only when needed do so. The same with a cut in a cienaga. I have known several springs completely lost by splitting the bed rock in blasting, and others that were permanent before opening have been opened so much that they have become dry before summer was half over. In all cases where it is evident the water comes from a local watershed calculate the amount that one-half the rainfall, falling on the area

would give you if you got it all. Then calculate as best you can the proportion of it you are likely to get. Even then you had better not risk any valuable trees or time on it until trial will show you how it will stand long draining.

OVER ESTIMATING THE WATER SUPPLY IS A COMMON FAILING
AMONG US

and it has been very foolish because very unnecessary. Don't be afraid to know the truth about your favorite enterprise. You had better recognize at once the fact that a reliable water supply is not found in every gulch, that it costs good hard earned cash and is well worth it.

Much money is wasted in pumping plants by too small pipes and too many right-angled bends with other causes of needless friction. In over twenty years observation of windmills and engines I have seen but one where the pump was not working against almost as much friction as gravity and often much more. The result either was that the pump was not raising half what it could raise or that it was costing twice as much for fuel as it should cost. It is a common impression that it takes four times the power to lift water in a four inch pipe than it does to lift it in a two inch. So it does if you have them both full and running at the same velocity. But it is quite the reverse if you are lifting the same amount of water in each. A four inch pipe will carry nearly six times the quantity that a two inch will carry. The lift against gravity will be the same in each but in the larger pipe the quantity of water being the same

THE STRUGGLE AGAINST FRICTION WILL BE NEARLY THIRTY-SIX
TIMES LESS.

This is a most important item in your fuel account on a long pipe against which the difference in cost of the larger pipe may be very trifling. The lift against gravity depends entirely on the diameter of the piston head and if you lift it into a fifty inch pipe or a thousand inch it only affects the time of filling it. But the difference in the loss by friction is enormous. All these things should be calculated before you order your plant.

There are other points on which you are already so well informed that I may better spend the rest of our limited time on a subject that I have found of great interest to a great many people. Considerable money will be spent on it this year. I believe I know as much about it as any one and that is

THE DIVINING ROD OR WATER WITCH.

Within the past ten years this ancient thing has gained hosts of believers and in the last twelve years I have tried thousands of experiments with it on all kinds of ground and carried it hundreds of miles in wagons, cars and on foot.

Like nearly all persons who have a profound respect for science

and especially for the beautiful principles of hydraulics, I sneered at the water witch as a humbug until one of our most cautious and reliable engineers told me it was not and showed me how to use it. Like every one else I jumped at the theory of unconcious muscular motion. But as that itself was quite a curiosity I determined to run that down. A long series of experiments, among others trying it with children of ten or twelve years of age who had no idea of what I wanted of them, satisfied me that with about five persons out of ten the dip of the rod is real and not imaginary or due to muscular motion of any kind. Hundreds of trials over places where I knew there was an underground stream or a pipe convinced me that running water under ground will affect it in the hands of about five out of ten persons and that in the other five nothing will produce any motion. I am still satisfied that water underground will do so and on three different occasions on three different pieces of ground I have run within three feet of the marks made there before by some of the experts travelling about and in whom so many have such confidence as to pay them good fees. I would not be afraid to take the contract to locate a pipe for miles blindfolded if water were moving in it and do it within a very few feet. But how many of all the experts have

TESTED IT WHERE THEY KNEW THERE WAS NO WATER, OR WATER
AT SUCH A DEPTH OR IN SUCH SMALL QUANTITY AS TO BE
UNAVAILABLE?

I believe I am the only one. I have tried it hundreds of times on sharp, dry ridges where it was plain that there could be no water for four hundred feet. Something moved it there as well as where I knew there was water. I mean moved it sometimes for generally in such places there would be motion.

What it was I know not but am quite certain that it was not water, oil or any liquid with still less probability of its being good or anything else of any value.

In a recent action for misrepresentations in the sale of a ranch I was sent by defendant's attorney to examine the ground and especially the water supply. It was a fine bench of rich land on the west side of the low range of dry porphory that runs through San Diego county from six to ten miles from the coast. The rainfall was only about twelve inches and the local watershed not large enough to furnish ten miner's inches if one caught it all. One well some fifty feet deep furnished about six thousand gallons a day or about half an inch. Two others sixty to eighty feet deep were dry and always had been. There was not a sign of damp ground or water vegetation of any kind on the watershed. The hill ran only some two hundred feet above the bench and then dropped into a canyon some four hundred feet lower which rose into a range of granite hills almost as dry as the porphory. I knew the whole country for twenty miles

around and there was no watershed that any one could be justified in connecting with it except the small one on the porphory hills of less than a hundred acres. On this a noted expert with the divining rod had located in one small gulch eighty inches of water, in another some two hundred and in another something near a thousand. I tried the rod over and over on the same places and

FOUND EXACTLY THE SAME INDICATIONS HE DID.

But I told the attorneys not to ask me a single question about the water supply of that ranch and advised them to keep that expert off the stand. After much consideration and debating they followed my advice.

With all my failings no one has ever accused me of being lazy when I try to study up any subject. I have tried my best to make practical use of the divining rod as a valuable part of the business of water development and hydraulic engineering. After a vast amount of experimenting and comparison of notes with others the only conclusions I can reach are these:

It does indicate flowing water underground but not above ground.

But it also indicates something else or else water so deep or in such small quantity as to be of no use.

It takes a large amount of practice to keep from being deceived by it in any case.

It is always liable to mislead one greatly as to the amount, velocity, breadth or depth of the underground stream. From these
THE ONLY PRACTICAL CONCLUSIONS THAT I CAN DRAW ARE THESE:

If on other sufficient grounds it has been decided to bore a well or drive a tunnel for water on a certain piece of ground then in locating the exact place to make such well or tunnel I should follow the instructions of the water witch in practiced hands rather than locate it by guess.

But if the question is whether to bore that well or make that tunnel there at all or not then I want to know considerable more. I want all other questions answered as satisfactorily as if there were no such thing as the water witch.

These are the principles I should follow in spending my own money. You had better consider them well for this will be a great water witch year and many a dollar will be staked on its indications which the land owner can ill afford to lose.

THE IRRIGATION PROBLEMS AND POSSIBILITIES OF NORTHERN WYOMING.

SOME NOTICEABLE CHARACTERISTICS OF THE WATER SUPPLY, CONDITIONS FAVORABLE FOR A PROLONGED AND UNIFORM DIS- CHARGE OF THE MOUNTAIN STREAMS

BY COL. E. S. NETTLETON.

I had the good fortune in August, '97, to be invited by State Engineer Mead to join a party of engineers in an exploration trip through the northern and northwestern part of the state of Wyoming. The plan was that we should meet at Sheridan and outfit there for a journey of about two hundred miles over the Big Horn mountains, across the Big Horn basin, and up the valley of the Gray Bull river.

As this part of the trip would be through a country having a few settlers scattered along the route, we concluded to "go light" and dispense with a commissariat and take our chances of foraging on the settlers for what we needed that rod and gun failed to supply.

This plan was carried out, it taking about eight days to make the trip to near the head of Grey Bull river and back to the town of Meeteetse, a distance of 210 miles, odometer measurement. At Meeteetse the outfit of terms was sent back to Sheridan, it being necessary from now to near the end of our journey to travel through an almost uninhabited country and to provide ourselves with a complete outfit with a commissary equipment. This was obtained in the town of Cody—thirty miles north of Meeteetse—from Col. W. F. Cody (Buffalo Bill).

Instead of making our way west and across the Wind River mountains at the head of the Grey Bull drainage, we turned south from Meeteetse and crossed the Owl mountains into the Wind River drainage and the Shoshone Indian reservation, then followed up Wind river, crossing the Wind River mountains at Union Pass on the north side of Union Peak, which peak marks the common point from which the water flows that made the Columbia's discharge into the Pacific ocean, the Colorado's into the Gulf of California, and the Mississippi into the Gulf of Mexico.

The wagon trail from Union pass took us over into the Green

river drainage and shortly into the valley of the Gros Ventre, a tributary of the Snake river, which joins the southern part of Jackson Hole, a broad valley laying on the eastern side of the Snake river. From here our course was almost due north, following up the valley of the Snake and crossing over the continental divide again into the southern part of the Yellow Stone Park reservation.

At the Mammoth Hot Springs, in the northwest corner of the park, the wagons were sent back to Cody by a short route, one of the party returning with the teams to do some stream gaging, the rest of us returning by rail. The journey occupied thirty days, and the total distance traveled was about six hundred miles, with no delay or accident of any kind. Four mountain ranges were crossed and the continental divide was crossed and recrossed four times.

Although the route traversed was through a mountainous country, generally speaking, yet we had very many good opportunities for observing a large number of the physical conditions that will in the future control the development of this part of the state. We passed through hundreds of thousands of acres of fine country susceptible of irrigation with a magnificent supply of water. Bordering and surrounding the irrigable areas are millions of acres of grazing land. There are some indications of gold placers existing on some of the water courses on the Pacific drainage. The climate is evidently as favorable for agricultural pursuits as that of much lower latitudes in other sections of the Rocky Mountain country of the same elevation. At present the means are very limited for transporting to market the products which the country is well adapted to raise.

One of the most interesting and striking thing to an irrigation engineer that was observed all along the route was the large quantity of water in the streams at that season of the year. The snow of the previous winter in the mountains had all disappeared save a little here and there in patches on the higher peaks and at lower elevations in some of the spots sheltered from the winds and sun. There had been no rains at that time perceptibly to increase their flow. Yet in August and September we had some difficulty in fording some of the streams whose sources seemed to be only a few miles distant. Their beds and adjoining banks plainly indicate that they are not subject to very high or very low water, every indication showing that their flow is very uniform and regular, somewhat like a stream which is the outlet of a lake of considerable size. Nowhere in the Rocky Mountain region have I ever observed what appears to be so large a percentage of run-off compared with the annual precipitations. This was especially noticeable on the Pacific drainage or the country on the east side of Snake river.



GROSS AND GRUSE CREEK DITCH WHICH TURNS WATER FROM BIG INTO LITTLE HORSE CREEK.

At this season of the year the streams in the mountains of Colorado would be many times smaller with the same proportional drainage area. The reason for this is quite easy to explain. It is very probable that there is a greater annual precipitation on the country under consideration than in the Colorado mountains, but this does not materially effect the proportion of the run-off as compared with the precipitation; so we must look for other causes.

The mountainous country in northern Wyoming is less precipitous and has a deeper covering of soil than in Colorado. These conditions are favorable for a prolonged and uniform discharge of the streams. Then again, there are scattered all through the country we traversed a great number of lakes, ponds, marshes, bogs, soft and grassy meadows, etc., all of which tend to check and equalize the run-off. A much greater proportion of the annual precipitation falls in the fall, winter and early spring months in the form of snow than in Colorado; hence a more even distribution of the flow of the streams through the irrigation season, especially when the conditions above mentioned are present to store away in the earth as in a sponge the intermittent supply that comes in the form of rain and snow.

As I remember the mountain streams of Colorado twenty-five to thirty years ago, from the Cache la Poudre in the north to the Purgatoire in the south, they had a much longer "run" of snow water than they now have. The general character of the Wyoming mountain streams of to-day and those of Colorado in the early seventies closely resemble each other. In the early days, before the occupation of the mountainous portions of Colorado for mining, stock raising, lumbering, tie-cutting and other purposes whose operations have had the tendency to change somewhat the surface conditions of the gathering ground of the water supply, the volume annually discharged by the streams was without doubt greater than the average for the last ten or fifteen years; and instead of the maximum volume caused by the melting of the winter snow occurring from the first to the middle of July each year, it is now fully a month earlier, and the gradual decrease in the volume, or tapering off, of the "summer rise" is now more abrupt, consequently bringing the period of low water earlier in the season.

For irrigation purposes, the conditions of the water supply that existed in early days in Colorado are preferable to those of to-day, and the query is, to what extent man is responsible for the causes that have wrought these apparent changes in the character of our water supply within the last thirty years. Are they due in part to climatic changes which may or may not be repeated within a certain cycle of years? and are Colorado and Wyoming likely to see these conditions reversed?

IRRIGATION IN RUSSIA. I.

A PROFESSIONAL VISIT TO THE TOLSTOI DOMAIN NEAR TYLA, CENTRAL RUSSIA.

BY L. LODIAN, c. e., Paris, Fr.

(Exclusive for the IRRIGATION AGE.)

After crossing Asia from the Pacific Ocean to the Ural Mountains, crossing Russia in the fall of '97, I received a professional call or invite from the illustrious Tolstoi; he wanted me to go over his estate with him for an expression of opinion, etc. I ciphered forward, accepting at once.

Now Tolstoi happens to be an interesting person in the eyes of Americans at the present time; so I will in this first paper give you an insight into his home life from my own observations; and tell about the irrigation on the estate later. I think most readers will pronounce this the more interesting course.

TOLSTOI, AN INSIGHT INTO HIS ESTATE AND LITERARY LIFE.

"Venez."—Tolstoi. Such was the brief dispatch handed me in passing through the small town of Riajht, Central Russia, in September, '97. Riajht is a junction-point of departure either for Mockba (Mosko) via Riazan or Mockba via Tyla (pronounced Tula)—the latter route some 80 versts longer. The Tolstoi domain is some 15 versts to the southwest of Tyla.

GOING.

I had made up my mind to proceed via Riazan to Mockba, and not touch Tyla; but the Tolstoi missive changed that. Besides, I had often expressed a wish to see how a camobap (pronounced samovar) was made.

A RUSSIAN NABOB'S HALF-WAY HOUSE,

Some 40 versts before reaching Tyla, arrived the evening at a small stancia with still smaller accommodations for a wayfarer—or better said, none at all—and having perceived in the distance a "big white house" I sent in my card; soon there was a horse and trap outside the stancia, waiting to take me to the place. It transpired this was the residence of the Kniaz, or nabob, Obolencki, and it was his son who had driven over for me. (The dictionary translates kniaz into "prince.") He is one of the more noted horsemen and horse-raisers of Pocia. Introduced to the family, I saw a couple of days slip by here pleasantly enough—going over the estate, inspecting the stock. The poor Kniaginia has had her share of sorrow. One of her

sons was "burnt to death" or rather died from severe burns; her eldest daughter was drowned only the other year; and other domestic troubles have tried her in a manner to which women of less fortitude succumb. It was here for the first time that I began to find myself among the intimates of Tolstoi. A cousin of the family had only recently married one of the great *grazdanin's* daughters.

On the morrow, after breakfast, I was off—accompanied for a little distance by the youngest *kniajna*, just to (at her mother's request) indicate a shorter route to the *stancia* (station). At parting—alone in the autumn-tinted glade—I saluted her *Russian fashion*—(quite an exceptional thing for a westerner to do)—she kissed me on the forehead in return, and bounded off "like a hare." A good sign, that. It is perhaps a worthy institution among Russian women to bring up their daughters to be timorous of men.

ON THE WAY AGAIN.

Arrived at Tyla, I inspected one of the biggest *samovar* factories. A *samovar*—the steaming *samovar* of the tea-table—is one of the minor glories of Russia.

On the morrow, the 12th (24th) of September (Friday), the Tolstoi mansion was reached.

After leaving Tyla, going south, the country seems to suddenly get picturesque, and by the time the Tolstoi domain is reached, one is in a charming country. The few visitors who get to the place, mostly alight from the cars at the *stancia* *Iasnaia-Poliana*, which means, by the way, Saint Thik. In calling I was three days in advance of the appointed time, having written, in reply to the invite, "15th"—a one-word response. "Brevity is the soul of intelligence." I was thus three days ahead of my schedule, but that was a minor matter.

The domestic having announced "an American engineer," Tolstoi himself came to the door. It was easy to recognize him from the public prints. "You Lodian?" said he in surprise.

L.—So.

T.—And when did you get here?

L.—This moment.

I was wearing a neat-looking, compact mining engineer's woolen costume—internationally made—that is, suitable for either the mines of the Amur or the alameda of Mexico, or the Unter-den-Linden of clean Berlin. To keep down the baggage curse all my clothing is thus made. As such a custom is a semi-military looking one, I half believe the illustrious Russian g. o. m. took me for a Ross too, especially as the hat was a native one and the boots military. Meanwhile I had proceeded with Tolstoi into the big dining or family hall upstairs. The morning coffee was just being served. Tolstoi took his coffee and cuts of sweet-bread downstairs to his study—his usual plan—saying about 11 a. m. he would be free and we would go for the

morning walk over part of the estate. Fine coffee that, after the many months of tea, tea, tea, in the Trans-Ural, here was I relishing some pure coffee, as good as that drunk by the vaqueros of the cieras, or sierras, of Mexico, whom—since the '94 travels among them—I have always regarded as drinking the best and most fragrant on earth.

PERIODICALS AT TOLSTOI'S.

A couple of window tables in the room had heaps of newspapers of various climes—several English ones among them. Here was the London *Daily Chronicle*, containing some "letters" on the trans-Cibirian railroad from a "Special Commissioner," who like the majority of other writers, did not know how to spell Cibiria properly, for the proper way is Cibiria, not "Siberia," the old way. Cibir now has the termination *ia* so as to be a generic name including Kamchatka and the Arctic ocean islands. As I had been one year inspecting the great Cibirian railroad and literally knew almost every verst of the road between the Pacific ocean and the Ural mountains—more minutely, in fact, than any Russian engineer living—I was quickly able to detect that the letters were rife with errors. Were they written in Fleet street? There were some copies of the *Open Court*, of Chicago, and the *Liberty Review*, of London, and a number of periodicals of the, as a western medico has aptly said, "learned nonsense" type. Talk, talk, talk! Better if their runners did a little useful work, work, work! Those publishers or redactors who think Tolstoi has time to read these efemera, make a mistake.

OVER THE ESTATE: THE FIRST MORNING WALK WITH TOLSTOI.

At 11 or soon after, the graf appeared and off we went afoot over the estate. It abounds in charming views, is well timbered, and has a big orchard. Apples by the ton had been heaped up in the orchard, and were being packed away in boxes. All this business of sale was managed by the son who sold to the city middlemen—who of course, pocketed three-fourths of the profits. It would be, I thought, more socialislic—capitalistic—if the son abolished the middlemen and let the three-fourths profit also go into his own pocket. But that is none of my business.

Numerous the subjects on which we talked. As in the engineering world I probably "hold the record" for travel—both sub-Arctic and ultra-Tropical—I could tell Tolstoi a deal about native customs. Some of their proverbs interested him greatly. "You can judge of a people by their proverbs," it had been said. One Hindu saying which was first interpreted to me on the southern slope of the Hymalayas in September, '95, impressed him. I give it as semi-original, for perhaps, it has already been pirated (like many other proverbs) from the eastern by the western world. It is this: "Youth—a folly; manhood—a blunder; old age—a regret."

The short sojourn in Tibet, the prolonged Latin-American tours, the rambles in Antipodia; the researches in greater Indasia, Korea, Japan, Manchuria; then the trans-Asiatic journey to the Ural mountains, the oft-repeated journeyings in southwestern Europe; even the visit to the ancient little republic of Andorra to the fastness of the Pyrenees;—all these were interesting themes for the Russian Voltaire; as was also the project of the coming trans-Arctic surveys.

NOT ENTIRELY SATISFIED WITH TRANSLATIONS OF HIS WORKS.

No work was ever improved by translation. On the contrary, most all works are spoilt by translation. An argument in favor of a universal language. Translators are mostly corruptors-spoilers. Most translators have the pernicious habit of making the translation as radically different as possible from the original—perverting words, destroying correct punctuation—making a general botch, in fact. Instead of translating into the most similar-sounding words, the literary quill-driver strives to use the most different, although synonymous, words they can hook on to. Thus “citoyan laborieu,” instead of being changed into “laborious citizen” is mistranslated to “hard-working subject.” And so on might illustrations be quoted by the thousand. Tolstoi had particularly to comment upon the work of one lady translator—mentioning her name, which I forget. He quoted instances—too abstract to go down here. He said she understood Russian—“well” I think he said, and believed she had done her best; still he was not satisfied at all with some of the renderings. A perfect translator of any language has never yet lived.

HAS HIS MANUSCRIPTS TYPE-WRITTEN.

Some Americans have introduced type-writers into Russia in recent years. It is a standing illustration of a thing which is wrong in theory but right in practice. At Tolstoi's a Russian brunette is employed to do the work. She is treated as one of the family. Poor young woman! She is more sympathetic than her work, for a glance at her results showed she had been having trouble with the ribbons or inks and the copy came out blurred. But she is probably doing better now. Moreover the Russian type characters put into these machines by United States makers, are faultily indistinctly designed. I explained my own typewriting apparatus I had invented in Bengal in the summer of '95, giving a speed of 1,000 words per minute if desired, but cumbersome at forty pounds weight. I used it greatly in Indasia; also on the Russia liner to print a little 8-page afternoon daily during the three-weeks' voyage to Japan; nearly wore it to death in Nipon; then carried it among baggage almost across Asia, and finally abandoned it at Tomsk, western Cibiria—making a present of it to the museum of the government tipografia. (January, '97.)

TOLSTOI'S HOURS.

Assigned the room on the ground floor immediately next his, and Tolstoi passing through the writer's to get in and out, I naturally saw him a good deal during the short stay. He was astir before I was, and would be at work till 9:30 or 10 ere he came up for his "koffee and krullers" or the Russian equivalent. With these he would dive down stairs into his studio again—to reappear at 11 or thereabouts for a morning walk.

Those daily walks were and are the pleasantest souvenirs of the visit. By midday the daily walk over a portion of the estate is terminated—winding up in time for reaching the big hall for breakfast, which is ready about 12. Tolstoi confines himself to vegetable dishes but for the ladies of the house go in also the three f's, so I shared with them. My experience of travel in the three worlds has taught me to "take what I can get"—be it the roast monkey of the straits settlements; the potted alligator of the Amazon; the conserve de crocodile of the Nile; the mule steak of Paris; or the stewed slugs of Tibet. The common "beef-steak" of the Russian poor is a thick slice of sour-smelling rye bread. I have often dined off it alone, but prefer the meaty article. Russians, by the way, have an excellent way of speedily rendering the toughest meat tender. They run it through a sausage machine.

Tolstoi appears at table in the same costume in which he walks and works. His dress is neat and plain, pure wool, roomy—a quaint national costume—which the garb of "fashion" never was. The coat is the nicest-looking kind of semi-blouse I ever saw; with straps round the waist and semi-military collar. It is not at all long, only just passes body. I had one made like it (from memory) at Paris, and named it the Tolstoi habit (coat).

After the late breakfast Tolstoi goes to his studio for a little more work; then takes his siesta, or nap, and does not reappear till the afternoon tea; then to work again; and comes up to dine at about 8 p. m. This over, I used sometimes to accompany him, at request, on the piano—for I possess the ventriloquial faculty of imitating the violin. So provokingly similar is the imitation that the music of a Stradivarius being apparently evoked from a walking stick worked bow fashion through the fingers, has often convulsed a family audience with laughter. "A ventriloquist Paganini" once remarked a professor on the Ganges. About 10:30 or 11 the family retire for the night—Tolstoi in the studio—for I believe his couch is in the same room.

INTERVIEWING WITHOUT ASKING QUESTIONS.

I never saw the interior of that room, and had no curiosity to do so. I learnt all I wanted to know about Tolstoi without asking a question. Although my visit was never even suggestive of the vulgarity of the interview, still, it is a point I would impress upon "professional interviewers"—i. e., the desirability of interviewing without a single question. This can be done by references or comments calculated to elicit replies.

SEWAGE IRRIGATION.

A SCIENTIFIC ESSAY ON THE SUBJECT.

REPORT OF G. A. RENE, M. D.

To silence the objections of those who were opposed to the use of sewage water for irrigation purposes, in San Bernardino County, Cal., the county health officer, Dr. René, made a report on the subject, claiming that with proper precautions its use was not detrimental to health. *The Citrograph* (Redlands) publishes the report in full. His remarks were concerning the use of the sewage from the city of Redlands, Cal., but the conclusions obtained may be applied to the use of sewage from any city. We give it as follows:

To begin, I will say that I would consider it the height of folly, during this perilously dry season, to throw aside the use of a stream of water, sufficient to irrigate from eighty to a hundred acres, without well founded reasons. Every broad-minded person ought, in an emergency like this, to discard all old-fashioned prejudices and be guided only by common sense and good will toward his fellow men.

There can be but one possible objection to the use of this water, and that is, that it would interfere with the health of other people. Allow me to express my opinion about this.

During the last twenty years the question, how best to dispose of the sewage of cities, has occupied some of the best minds. The result has been that many new truths have been evolved, and many old beliefs have been exploded. I cannot enlarge upon this interesting subject on account of the narrow compass of this paper. I will only state that it is now acknowledged, beyond dispute, that the best way to dispose of the sewage of cities is by irrigating and fertilizing the land. This has been so universally conceded that it may well be considered a *res adjudicata*. (See irrigation papers of the United States Geological Survey, No. 3, page 48.)

Of course, certain precautions have to be taken. The most important are filtration, conveyance of the sewage in pipes, and the spreading of it over a large enough area of land. Also, sewage ought never to stand still, at least not in the open. I understand that all these precautions will be taken. Hundreds and hundreds of cities in Europe and the east now dispose of their sewage in this manner.

The most important agencies which nature employs to protect life are the soil, the air, and sunlight. The first quickly nitrogenizes organic matter and converts it into plant-food. On the other hand,

air and sunlight rapidly decompose any organic matter with which they come in contact, by oxidizing it. For instance, sulfuretted hydrogen, a gas most obnoxious to our sense of smell, is, when it once comes in contact with the air, at once decomposed into water and minute flakes of harmless white sulphur, which float away into infinity. As the obnoxious part of common sewage consists almost exclusively of organic matter, it stands to reason that it will be quickly rendered harmless by those powerful disinfectants of nature, if thoroughly exposed to them.

What I have said ought to satisfy all fair-minded persons that the using of sewage for irrigation is perfectly justifiable. But there is another point, as important as this one, which has to be explained.

It is claimed that some of the sewage, after it is used for irrigation, may enter Mill Creek zanja. The gentlemen interested claim that this can be easily avoided with care, as any superabundant sewage may, at any time, be turned off on to the sewage farm. But suppose some of it will enter the zanja. After all, it can be but very little, and this little already greatly purified by its previous distribution over the land.

And, indeed, I am at a loss to understand how this small amount of sewage can hurt a stream of water which is already exposed to the leakage from thousands of acres of land treated continuously with natural as well as artificial fertilizers. For a long time the settlers below have discarded the use of this water for domestic purposes.

But to settle this matter, conclusively, let me explain what this pollution really amounts to.

Should any sewage enter the zanja it mixes at once with a large body of water. The stream has considerable fall, rushes over a pebbly bottom, and its waters are continuously revolved to the surface, bringing them in contact with air and light—Nature's disinfectants. In a stream like that all organic matter must be quickly oxidized. I will give an illustration how rapidly streams will purify themselves.

Nearly all the cities in the great Sacramento river basin, from Red Bluff down, Oroville, Colusa, Yuba City, and so forth; almost all the large settlements along the affluents of the Sacramento river discharge their sewage into the respective streams. Further down the populous city of Marysville adds her quota. From there down the Sacramento river is very sluggish, and offers but limited opportunities to nature's disinfectants. Yet, during its twenty miles' course from Marysville to Sacramento, the river has purified itself so much that the citizens of Sacramento prefer to drink the water from the river to that from the deep wells at their disposal. And what is more, the death rate of Sacramento has not increased during the last twenty years, though the people have used the river water almost ex

clusively during that time. (Report of State Board of Health for 1896.)

I could cite other instances, some of them from our own county, and which have been under my own observation, but the case I stated is typical of all the others. And, indeed, it carries a practical argument along in itself strong enough to convince the most skeptical.

I may add that a contamination of surface or artesian wells from the use of sewage for irrigation is practically impossible. The disinfecting action of the soil is so energetic that, a short distance under the surface, all organic matter will have been converted into plant-food, or at least rendered harmless by decomposition.

To sum up, I will state:

1st. That no well-founded objection can be raised against the use of the city's sewage for irrigation, provided that the few simple precautions to which I have alluded above, will be taken.

2d. That no obnoxious gases (or vapors, or smells,), sufficient to annoy the neighbors, will be created by its use.

3d. That the use of the sewage for irrigation cannot possibly endanger anybody's health.

4th. That the possible leakage of some sewage into Mill Creek zanja, cannot, under existing circumstances, influence, or change for the worse, the present sanitary condition of its waters.

5th. That no seepage of a dangerous nature, through the sub-soils into wells can take place from using common sewage for irrigation; neither from the irrigated land nor from Mill Creek zanja.



FARMERS' HOMESEEEKERS' LEAGUE DEPARTMENT.

In Charge of J. HAMMOND.

Among the correspondence of the last month I have at hand a very interesting letter from Mr. S. H. Ellis, President Ohio Agricultural Experiment Station. As it touches on points of general interest I hope you will accord it space in your columns. I also ask the same favor to my reply thereto.

J. HAMMOND.

WAYNESVILLE, OHIO, March 28, 1899.

MR. J. HAMMOND, CHICAGO, ILL.

Dear Sir:—Your circular and letter of the 23d to hand. While your scheme of starting a colony is in many respects praiseworthy, yet it seems to me that we have multiplied thousands of acres of land now within the bounds of civilization, that could be cultivated and thereby give employment to labor, if prices of farm products were such as to remunerate the farmer. Farms all over Ohio are today selling at less than fifty cents on the dollar of what they cost a few years ago. Why take young families to the arid regions of the continent where even if they did "raise more on 20 acres than they can here on 80," it would take the product of 80 acres to get that that was produced on 20 acres to market. Railroads would take all there was in it. No, let the young men and women remain in Ohio and Illinois and assist in reclaiming our government from trusts and political rottenness.

Yours truly,

S. H. ELLIS,

Master of Ohio State Grange.

MR. S. H. ELLIS, Master Ohio State Grange.

Dear Sir:—We have no desire whatever to take away people who are etttled down or can do well near home. The invitation to join our League i only extended to "homeseekers," i. e. those who, for various reasons have already decided to seek their fortunes elsewhere. To such we say, "Do not make the mistake of going to the large centres of population. The labor market is already so overcrowded that except for skilled mechanics it is almost impossible to obtain remunerative employment. Even should you succeed you will find that a large city is not a good place to be in for a young man just away from the influences of the home circle."

Heretofore the free government lands of our prairie states have been a suitable outlet for the class of men I refer to, but since these are all gone, it becomes a matter of general importance that our western irrigable lands, of which there are many million acres, be made equally accessible to those of very limited means. For this reason the Farmers' Homeseekers' League has assumed the task of securing for its members desirable land from the government free of charge. This is quite practicable, provided the membership is sufficiently large and composed of the right stamp of men—industrious and of correct habits.

The promoters of our movement believe that on irrigated lands a very high type of civilization can be established wherein the principal business of a man will be to supply the needs of his own household, buying outside only when he cannot help. To our minds the following of such a policy is the only effectual way to combat trusts and combines just at the present time. We do not intend to grow grain for the board of trade to gamble with and to enable railroads to pay dividends on watered stocks. Nor will we raise cattle to help millionaires to pile up more millions for themselves. We can emancipate ourselves from the thralldom of the oil trust by using the power derived from our irrigation system to produce electricity for lighting and other purposes. Then as to Mr. Havemeyer it is quite possible he may have other competitors besides Mr. Arbuckle in view of the fact that sugar beet culture under irrigation has proved so satisfactory that such lands having convenient access to a sugar factory have been valued intrinsically at \$500 an acre. To sum up, we believe that under the conditions we expect to create it will be quite possible to maintain a large family in comfort on five acres intelligently handled.

Yours respectfully,

J. HAMMOND.

The work of the league at the present time is confined to the enrolling of members and to the collection of statistics and information in regard to suitable location for the colony.

Particulars have been received of eligible sites with home markets or ou surplus that can be depended on now and for all time. Their location I dare not as yet make public for a reason that I will briefly explain. Under either the Homestead or Desert Land Act a citizen of the United States has the right to file on and appropriate to his own use 160 acres of government land be it irrigable land or otherwise. Thus directly it became known that our colony intended to reclaim such and such a tract of land a number of greedy eople might make a rush to grab up all the choice portions of it and thereby defeat the carefully laid plans of our League.

A correspondent enquires why we do not buy from land companies who have lands already reclaimed, and thereby save time. I replied that such lands were held for sale at from \$25 to \$50 an acre, and that most of our members could not afford these prices, nor indeed was it necessary for us to do so if we could, as we can acquire just as valuable lands and reclaim them ourselves at a cost not to exceed \$2.00 to \$8.00 an acre.

The requirements of the colonists to get started consist of machinery, implements with shelter and subsistence until the land can be brought to the producing stage. The amount has been roughly estimated at about \$150 to \$200 per member. On inquiry we find that arrangements could be made for supplying these to the colonists and allowing them time to pay for them. For our part, however, we would much prefer not to run into debt, but that the members of the League and their friends should furnish the capital required

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs. Also sketches or plans of convenient and commodious barns, hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us improve the appearance of THE AGE?

AGRICULTURAL CAPABILITIES OF ALASKA.

A second report on the investigations of the agricultural capabilities of Alaska, ordered by Congress, has been issued. The investigations were conducted last year under the direction of the Director of the Office of Experiment Stations of the U. S. Department of Agriculture, by Prof. C. C. Georgeson, who is thoroughly familiar with the conditions of agriculture in northern Europe, and who has had a long experience as professor and experiment worker in Japan and Kansas. At the same time the Weather Bureau undertook the establishment of a special meteorological service for Alaska, and it was arranged that headquarters for Professor Georgeson and the Weather Bureau observer should be first established at Sitka.

Prof. Georgeson did not reach Sitka until May 12, and the late start he was thus obliged to make in his experiments was a serious drawback to their success. He found no broken land sufficient for experiments on a field scale, but through the courtesy of the governor of the territory, a priest of the Russian church, and the superintendent of the Presbyterian Mission School he was enabled to obtain enough land to make experiments on a small scale.

In spite of the late planting, oats, barley, flax, potatoes, and a number of different kinds of vegetables of good quality matured, and clover and grasses made an excellent growth. Useful data were also obtained from these experiments regarding the effect of different soil conditions

on the germination of seeds and the growth of plants.

The botanical survey which was made, resulted in quite an addition to the number of specimens of flora. Several specimens were found which may prove of considerable value as sand binders, for which there is great need in many localities in the United States.

The work of the past two seasons indicates how experimental investigations may be most efficiently prosecuted in Alaska, and arrangements will be made during the coming year for systematic experimental inquiries in that territory.

PRESERVING EGGS.

One of the many things needed by the farmer is a cheap and simple method of preserving eggs, so that he may put away eggs in the summer, when they are worth but five or ten cents a dozen, for use in the winter when it is almost impossible to obtain eggs at thirty cents a dozen. Dwellers in Chicago have paid fifty cents a dozen at times this past winter, for cold storage eggs. Lime, salt or brine, cold storage will preserve eggs after a fashion, but hen fruit so kept will be far from having the taste of fresh eggs.

E. F. Ladd, of the North Dakota Agricultural College, at Fargo, recently made experiments in this connection, and found that water glass is the most efficacious substance for preserving eggs. Eggs preserved in it for three and a half months tasted as well as the average fresh egg on the market. Contrary to the usual experience with packed eggs, the yolk re-

tained its normal position upon being boiled instead of settling to one side; they would also beat up well for frosting, etc. The eggs packed must be strictly fresh when put away, not more than four days old. Mr. Ladd gives the following directions for preserving them in water glass, which may prove useful to some of our readers:

Use pure water that has been thoroughly boiled and then cooled. To each ten quarts of water add one quart of water glass. Pack the eggs in the jar and pour solution over them, covering well.

Keep the eggs in a cool, dark place. A dry, cool cellar is a good place.

If the eggs are kept in too warm a place the silicate is deposited and the eggs are not properly protected. Do not wash the eggs before packing for, by so doing, you injure their keeping quality probably by dissolving the mucilaginous coating on the outside of the shell.

For packing use only perfectly fresh eggs, for stale eggs will not be saved and may prove harmful to the others.

All packed eggs contain a little gas and in boiling such eggs they will crack. This may be prevented by making a pin-hole in the blunt end of the egg. To do this hold the egg in the hand, place the point of a pin against the shell of the egg at the blunt end and give the pin a quick, sharp blow, just enough to drive the pin through the shell without further injury to the egg.

Water glass is a very cheap product that can usually be procured at not to exceed 50 cents per gallon, and one gallon would make enough solution to preserve fifty dozen of eggs, so that the cost of material for this method would only be about one cent per dozen. Water glass is sodium and potassium silicate, sodium silicate being usually the cheaper. If wooden kegs or barrels are to be used in which to pack the eggs, they should first be thoroughly scalded with boiling water to sweeten and purify them.

GLEANINGS FROM THE EXPERIMENT STATION REPORTS.

CHICKORY.

Most of us are familiar with the weed succory, but perhaps it is not generally known that this is only another name for chickory. Like the burdock, the oxeye daisy and many other plants, it was a native of Europe, but has become so naturalized in this country as to seem almost indigenous. In a bulletin gotten out by the Division of Botany United States Department of Agriculture, Maurice G. Kains writes of the possibilities of chickory growing for the farmer. The Romans used the plant as a salad or pot herb, as do the Germans, and it was first introduced in this country by Gov. Bowdoin, of Massachusetts, who obtained the plant from Holland about 1785. The leaves were used to some extent in Europe for making a blue dye, and for awhile it was used as a fodder plant for cattle and sheep until displaced by alfalfa. Its medicinal properties so closely resemble those of the dandelion that it is often substituted for the latter in the drug trade. It is also used quite extensively in Europe as an adulterant for coffee, and perhaps is best known to the public on this account. It is but little used for this in America, except among the foreign element, but in European countries it is not only used as an adulterant for different beverages, but is taken clear—the taste for it having been acquired by many. It is claimed that a moderate indulgence in it as a beverage is not injurious, and that as an adulterant of coffee it is comparatively harmless.

Chickory raising in Europe is carried on quite extensively, but in this country it has not progressed much beyond the experimental stage. It can be grown almost anywhere that the sugar beet can, and is a plant adapted to be grown upon alkali soil.

About six to ten tons can be raised per acre, though with good culture fifteen tons may be produced. The average price paid

for it at the factory is about \$7.00 per ton. Or the farmer may count on a net profit of from \$15 to \$30 an acre on the crop.

As it is not a staple, like corn or wheat, the market might be easily overstocked, so while it is a profitable crop for a limited number, farmers had best not embark in the cultivation of it unless assured of a market beforehand.

THE SOY BEAN.

The Kansas Experiment Station has been growing the soy bean for the past ten years, starting with a small patch, and increasing the area until last year 35 acres were grown. It is a good drought-resister, is not touched by chinch bugs, and the beans are richer in protein than linseed meal. With sufficient moisture to germinate them, a crop can be grown after wheat and oats are harvested. In 1896 the yield on ground after wheat was eight bushels per acre, in 1898 six and one-quarter bushels. With linseed meal at \$25 per ton, these crops after wheat would be worth \$6.00 and \$4.68 per acre. When planted earlier in the season, the yield of soy beans is from 10 to 20 bushels per acre. The soy bean not only furnishes a crop rich in protein, but at the same time enriches the soil. Henry Rogier, one of our graduates, reports an increase in large fields of five bushels of wheat per acre on land where soy beans had previously been grown, over land that had not been in soy beans.

With dairy cows, soy bean meal takes the place of linseed meal, being somewhat richer in protein, a laxative feed, and softening the butter fat. Not over three pounds per day should be fed to a cow, and the softening effect on the butter may be overcome by giving feeds having the opposite tendency, such as corn, Kaffir corn and cottonseed meal.

We believe the soy bean is worthy of a trial in all parts of this state, and that the trial should not be made on less than an acre; five acres would be better. Hundreds of people have tried planting a quart

of seed, with the result that grasshoppers and rabbits harvested these small patches. —*Kansas Ex. Station, Bul. 24.*

AN OLD IRRIGATION IDEA REVIVED.

L. J. C. Spruance has struck a novel idea to get the water down to the tap roots of his orange trees while the irrigation water is limited. He bores with a six-inch post auger a hole four feet deep on two sides of the trees about three feet from the trunk. These holes he will allow to fill with water when irrigating, thus placing the water where it is most required, to the tap root of the tree.

If the water supply is permanently scanty, bore the holes only about 20 or 22 inches deep and place therein a two-foot joint of light, sheet iron pipe, leaving it there permanently. A dozen buckets of water will do as much good in the pipe as a hundred times that much will do when spread all over the ground.—*Corina Argus.*

A CHANCE FOR THE GIRLS.

Fifty girl students have this year entered upon a full scientific course of farming at the Agricultural College in Minneapolis. Heretofore the opportunities afforded girls for study were confined to the few weeks of summer vacation allotted to the male students, but this year, as in others to come, one may assume they are to enjoy full privileges with the men. It is supposed, if the experiment proves successful, that other states may be induced to follow the example set by Minnesota, and that henceforth farm life may present such unwonted attractions to farmer lads as to induce them to stay at home.

EGGS BY THE WHEELBARROWFUL.

John R. Musick has written a book on "Hawaii; Our New Possession," and among other interesting information is something about the birds on Leyson Island, a small island about a hundred miles in extent, which is 800 miles west of Honolulu. Mr. Music says:

THE IRRIGATION AGE.

"On this small speck of land far out in the ocean, the birds lay, hatch, and die by millions. When they fly the sun is darkened as if a cloud had passed over it. The decaying bones, with disintegrated coral, helps to form the guano, which is exported every year by hundreds of tons in ships to the Hawaiian Islands and Pacific Coast. The birds seldom lay more than one egg before incubation, though often several in a season. They are very tame, and so bold that you can pick them up as you walk along the path. They snap at the trousers and dresses of persons who are crossing the island, so that one is compelled to carry a stick for self-protection. They gather on the railroad tracks in such numbers that a man has to sit in front of the car as it is being drawn by the mules, with a stick in hand, and push them out of the way. The eggs on Leyson Island are frequently gathered in wheelbarrows, cars filled with them, and schooners loaded. This industry, however, is unprofitable, owing to the great distance they have to be exported."

STATE FAIR AND EXPOSITION COMBINED.

The State Board of Agriculture and the managers of the Greater America Exposition, after discussion of the subject, have agreed to a plan for holding the Nebraska State Fair within the Exposition Grounds the coming fall. At a recent joint meeting at Omaha the plan of co-operation

between the exposition management and the Nebraska State Board of Agriculture by which the state fair will be merged into the Greater America enterprise was ratified so far as the exposition was concerned. It is confidently expected the State Board will ratify the action of its committee at a meeting to be held soon.

The Greater America Exposition agrees to place at the disposal of the State Board of Agricultural whatever space may be found necessary for a creditable exhibit in the Agricultural, Horticultural, Dairy and Apiary buildings, and to afford proper accommodations for all the live stock that may be placed on exhibition.

The Greater America Exposition agrees to employ such officers as may be mutually agreed upon to superintend the agricultural, horticultural, live stock, dairy and apiary exhibits.

The Exposition directory appropriated \$100,000 for the organization of a colonial exhibit and to send a representative to the Philippine islands at once.

ACTIVE SOLICITORS WANTED EVERY- where for "The Story of the Philippines," by Murat Halstead, commissioned by the Government as Official Historian to the War Department. This book was written in army camps at San Francisco, on the Pacific with General Merritt, in the hospitals at Honolulu, in Hong Kong, in the American trenches at Manila, in the insurgent camps with Aguinaldo, on the deck of the Olympia with Dewey, and in the roar of battle at the fall of Manila. Bonanza for agents. Brimful of original pictures taken by government photographers on the spot. Large book. Low prices. Big profits. Freight paid. Credit given. Drop all trashy unofficial war books. Outfit free. Address, H. L. Barber, Gen. Mng'r., 356 Dearborn Street, Chicago.

PULSE OF THE IRRIGATION INDUSTRY.

ELWOOD MEAD RESIGNS.

State Engineer Mead will resign his office at the close of the present fiscal year and will have charge of the work to be carried on under the appropriation of \$35,000 to enable the secretary of agriculture to investigate and report upon the laws and institutions relating to irrigation and upon the use of irrigation waters, with special suggestions of better methods for utilization of irrigation waters in agriculture than those in common use. Prof. Mead will aid the state irrigation authorities in the arid land states in the work of framing and enforcing laws for the uniform distribution of the waters of the streams by collecting facts, bearing upon the problems of irrigation, and making the same public through the medium of regular bulletins.—*Chejenne Tribune*.

A NEW PLACE.

The proposition to put in a portable pumping plant to use in the different wells about here is being worked up says the Chino (Cal.) *Champion*. It is believed that an air lift, with condenser and gasoline engine, can be made to work successfully in wells where water stands near the surface, and can be moved readily from place to place. There are probably half a hundred wells on the Chino ranch which might be pumped to great advantage, and the portable pumping plant could be used on enough of them to keep it busy throughout the summer. There are many pieces of land here which will produce nothing this year unless they are irrigated; there are wells either on them or from which they can be reached; yet the individual owners do not feel able to put in a permanent pumping plant. An irrigation stream could be pumped from one of these wells, then the outfit moved to another and the operation repeated.

It is expected to fit up such a plant and

make a test of it. If it works successfully it will be purchased. There are wells enough on the Chino ranch to keep a number of such pumps busy all the time; and it is believed that they will be a paying investment, for hundreds of acres of land can in that way be made productive which will otherwise remain idle. An experiment of this kind will be watched with interest, for if successful in its results it will be a boon to the farmer who cannot afford to buy an irrigating outfit.

KEEP THE RESERVATIONS CLOSED.

Sheep men are making a strong effort in Central California to have the forest reservations opened for their bands this summer. They set up a pitiful wail and, indeed, their case is a hard one, but a deaf ear should be turned against their appeals. The interests of the thousands of irrigators, who depend on the supply of mountain water, far outweigh the intetests of the few sheep herders. And it must be remembered that the damage done by the sheep in one year takes ten or more to efface. Sheep men should understand that the day of grazing thousands of head of sheep on the public domain, at no cost beyond the herders' wages, is passed in this state forever. The sheep herder must become the sheep farmer. He must graze his sheep on his own land, as is profitably done in all parts of the east.—*The Citograph*.

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WITH OUR EXCHANGES.

THE REVIEW OF REVIEWS.

The topics treated of this month include such important and timely ones as "The Material Problems in the Philippines," "The Czar's Peace Conference," "Canada's Claims Before the Joint High Commission," and very many more, all by writers of authority. A photograph of the new French president, with an account of the election at Versailles and a short biographical sketch of M. Loubet are attractive features of the number. "Landscape Gardening for Factory Homes;" contributed by W. H. Tolman, giving pictures of what has been made of the factory homes at Dayton, Ohio. The hints given could be put to profitable use by city people and transform their dwelling places from bare, uninviting "stopping places," to restful nooks worthy of the sweet word "home." Musicians will enjoy seeing the portraits of America's native musicians,—Miss Maud Powell, W. H. Sherwood, Clarence Eddy, and others equally well known, which illustrates the article on "A Group of Native American Musicians."

MCCLURE'S MAGAZINE.

Cleveland Moffett's account of his journeys on the engines and in the postal cars of the Fast Mail, at a rate of upwards of ninety miles an hour, gives the April *McClure's* a fairly dramatic opening. The intensity of service required of man and mechanism under the new schedule, that saves a full day's time between the two oceans, is depicted almost as the author's personal experience. The article is spiritedly illustrated by W. D. Stevens with drawings made from life.

The reminiscence of Lincoln from Charles Sumner, Carl Schurz, and others, embodied in Miss Tarbell's account of Lincoln's attitude and relation to emancipation, give the paper much historical value as well as add greatly to its interest.

Other noteworthy things in the number are a series of poems by Hamlin

Garland, "The Trail to the Golden North;" characteristic short stories by Rudyard Kipling and Sarah Orne Jewett; a strong story of political life, and a humorous little story of far Western life. It is an interesting number throughout.

LADIES' HOME JOURNAL.

Ian Maclaren, who is now on a lecturing tour in this country, begins in an early issue of *The Ladies' Home Journal* his latest piece of literary work. It is a series of popular articles in which he defines the relation that a minister holds to his congregation: how a preacher is helped by his people; how a congregation can make the most of a minister, and other phases of the most satisfactory attitude of a congregation to a pastor.

Miss Viola Allen, the "star" of Hall Crane's dramatization of his popular novel, "The Christian," has always aspired to be an author. She has said that there are two things which she would rather do than act: write a book, or be a trained nurse. She will now make her literary debut in an article which she has written for *The Ladies' Home Journal*, reciting and explaining fully "What the Life of an Actress Means."

THE FORUM.

The leading paper in the April issue "The Industrial Development of Russia;" and the writer is Prof. Ivan Oseroff, of Moscow University, a prominent Russian economist. An article by a Russian or Russian industries in an American magazine is a rarity; and Prof. Oseroff's survey is both comprehensive and—what is more important to the reader—exceptionally interesting. Another paper, on a subject of still greater importance to Americans, is that by Mr. John P. Young on "The Menace of England's Commercial Supremacy." Mr. Young proves conclusively the decadence of English agriculture, and shows the disastrous results to British industry of the invasion of the English iron and steel markets by American pro-

ducts. The writer considers that the inevitable outcome of existing conditions will be the development of an American shipbuilding industry which will be able to produce ships as cheaply as iron and steel are now produced in the United States. A descendant of George Washington's brother, writes in answer to the question as to whether or not our first president was the author of his farewell address. The principles of this famous address have been brought so permanently to public notice in the discussion of annexation that the article in the *Forum* is very opportune. The other contributors furnish matter which tends to maintain the usual high standard of the magazine.

SCRIBNER'S

The April *Scribner* is an Easter number and has a special cover in beautiful color and design, appropriate to the season. Quiller-Couch, a novelist of assured reputation, begins a serial under the fanciful title "The Ship of Stars;" Dr. Henry Van Dyke gives us "A Lover of Music," finely illustrated, while the quota of fiction is completed by the story by Jesse Lynch Williams of "The City Editor's Conscience." This character sketch of the

city editor, with his nerves strained to the breaking point, his fault finding, his irritability and then the period of relaxation, when, the paper safely out, he can again become a human being with a conscience troubled by his unjust criticisms, is so near like people we are intimately acquainted with, that we are sure Mr. Williams drew his character from life. The Roosevelt papers, the reminiscences of Senator Hoar and the letters of Stevenson continue with equal attractiveness, while "A Winter Journey to the Klondyke" will appeal to those who long for adventures in the frozen north. But of the entire contents, the best, in the sense of being most helpful, is "The Gospel of Relaxation," by William James, psychologist of Harvard College. It is a plea for the conservation of energy; it advocates the abolishment of worry; in short it bids you *relax*—not only your overworked muscles but also your overburdened brain and heart. Read it, all you hurrying, worrying mortals; you restless business man, with the "just-a-minute-to-catch-my-train" look and you nervous American woman who feels that like the man of ancient times, you have the world on your shoulders; read it, and having read practice it.

ODDS AND ENDS.

Next to running against a rocking-chair or an open door in the dark, the most provoking thing is to be led into reading a medicine ad., thinking, from its misleading title that it is a romance. With bated breath you read the story of the fond young wife who early in her married life sees her husband becoming estranged and distant. He is changed, gloomy; something is preying on his mind. You are right, there is, and if you read far enough you will learn that he was suffering from either dyspepsia or liver complaint and upon taking so-and-so's medicine he recovered and the home was no longer gloomy, etc., etc. And then you feel like the man does who kicks the old hat off the side walk on the first day of April.

It is nearly time for some enterprising reporter to interview Mr. Roberts of Utah, regarding his "white man's burden."

"Did your sweetheart write to you while you were away?" "Write to me?" said the poor soldier. "I had to give away my clothes so that I could bring her letters home."—Ex.

Watts—Seems to have been some trouble over at Wickwire's house,

Potts—Well, yes. His wife told him to advertise for a parlor maid, and he goes and puts in the ad. "blonde preferred."—*Indianapolis Journal*

A Thorough Sport.—The Deacon—Young man, don't you know that there's a rainy day coming?

Spendthrift—Mebby there is, but I've got \$5 that says the weather man won't call the turn. Come, now, if you've got

any nerve show your money.—*Chicago News*.

"I suppose your uncle had no scruples against killing people?"

"No, I think not."

"Did he ever say anything about how many he had disposed of?"

"No. He was a modest man and not inclined to boast."

"Let me see—what branch of the service was he in?"

"He was an army surgeon."—*Cleveland Plain Dealer*.

The fourth biennial report of the State Engineer of Wyoming, Prof. Elwood Mead, is a neatly gotten up little work, a credit to the printer, and aside from its mechanical excellence, is an exhaustive and complete report of the progress of irrigation in Wyoming. A great part of the book consists of statistical tables giving the permits issued since November of '96 to appropriate water and the certificates of appropriation, permits for new ditches, names of officers in charge of irrigation; records of ditch surveys, stream measurements, etc., etc.

The adjudication of water rights, stream gaging, reservoirs, irrigation investigations for the Department of Agriculture are among the many topics, of more than local interest discussed. "The Agricultural Problems and Possibilities of Northern Wyoming," running in the IRRIGATION AGE is incorporated in this report, which abounds in beautiful illustrations.

The Redfield (S. D.) *Press* says: "There is no truth in the rumor that Mr. P. D

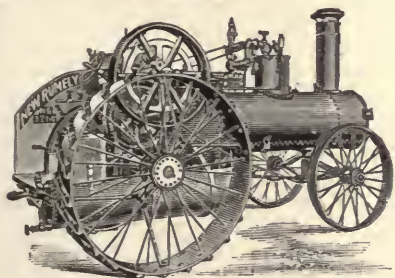
Armour is to be made president of the Pure Food Association."

In the recent session of the Utah legislation a bill was passed by which an appropriation of \$100,000 was made for the payment by the state of one-fourth the cost of constructing reservoirs. The author of the bill, Mr. Mansfield, said he thought the reservoirs should be owned by the tillers of the soil, and the plan of using the principal of the reservoir fund as a bonus to farmers for building reservoirs would bring about a great improvement in the irrigation system of the State.

The bill provides for the conversion of the 500,000 acres of the reservoir grant into cash, to be distributed as bonuses. Only 68,000 acres have as yet been set aside.

THE M. RUMLEY COMPANY.

The institution bearing the above name was established forty-six years ago and has been doing business and growing all these years at La Porte, Indiana. They are manufacturers of a line of machinery that has not only made them famous in this country but has been of such quality and superiority as to attract trade from European countries as well.



The M. Rumley Separators and Engines are known everywhere for the superiority of their construction and the uniform high quality of their work. The cut which we present herewith is that of the new Rumley Rear-Geared Traction Engine with Friction Clutch. It serves in an excellent way to illustrate the high quality of the company's product. This engine is famous for its high power coupled with economy as to steam and fuel; it is the

quickest steamer known and is possessed of high reserve force; it is possessed of unusual traction power and takes its load with ease over the most slippery roads. With all its size and power it is so sensitive to the steering apparatus as to be handled with perfect ease.

In addition to this Traction Engine these people make also Compound Traction Engines, Portable Engines and Semi-Portable Engines. In Threshers they manufacture the New Rumley Separator which combines the apron and vibrating principles, with leading spouts, high wagon elevators, clover hulling attachment, telescope weighing device, telescope bagger, etc. These machines are equipped with the famous Rumley Uncle Tom's Farmer's Friend Straw Stacker; the Rumley Band-Cutter and Feeder and the Rumley Automatic Stacker.

A full line of Dingee-Woodbury Horse Powers, Saw Mills of various sizes and Maurer's Automatic Bailing Presses completes the line. Every article is the complete embodiment of good material, good skill and perfect workmanship. Write them for large illustrated catalogue which they will take pleasure in mailing to our readers.

IT WAS A QUESTION OF VERASITY.

The *London Telegraph* tells this Monte Carlo story: "A woman entered the salle while a prince whom she knew was winning in a sweeping style that seemed destined to break the bank. 'I am so glad to see you here prince; and in such luck, too!' she exclaimed. 'Do tell me a lucky number: it is sure to win, for you are now in the vein.' The prince generously placed a pile of gold louis before the vivacious lady, whose beauty had successfully defied the effects of thirty-six winters, and said: 'Put it all on the number of your years and reap a golden harvest;' The lady reflected, hesitated and then placed the pile on twenty-seven. An instant later the croupier sang out, 'thirtyp-six red wins!' The lady muttered, Ah, mon Dieu; thirty-six is exactly my age,' and fainted on the spot."

THE IRRIGATION AGE.

AN ILLUSTRATED MONTHLY.

Entered at the Post Office at Chicago, Ill., as second-class matter.

THE IRRIGATION AGE is a Journal of Western America, recognized throughout the World as the exponent of Irrigation and its kindred industries. It is the pioneer journal of its kind in the world and has no rival in half a continent. It advocates the mineral development and the industrial growth of the West.

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WATER FALL AND CASCADE, BIG GOOSE CREEK, WYO.

THE IRRIGATION AGE.

VOL. XIII.

CHICAGO, MAY, 1899.

NO. 8.

THE PROGRESS OF WESTERN AMERICA.

Savagery or Civilization. If we should read that the savages in the Philippine Islands or some other uncivilized land had roasted a human being alive, after first cutting off his ears and fingers and pouring kerosene oil over his bleeding body, we would doubtless be horrified beyond measure at such barbarism among the heathen. What, then, shall be said when this revolting thing occurs in our own midst, in a civilized, christianized community? This was what an infuriated mob of southerners did to a negro recently. The press throughout the country gave an account of the affair with all the gresome details, but the feeling in the section was not very strong against the mob. We need not cross the ocean to "Take up the White Man's Burden." We do not wish to be understood as sympathizing with black brutes, who commit fiendish crimes, but we wish to be understood as being on the side of law and order. Let the law take its course. Because a negro—a descendant of a race of slaves, degraded and hampered by circumstances,—gives way to the baser instincts of his nature, should white men—with every advantage in their favor be excused for brutality and cruelty that would disgrace a savage?

It was not so much the crime that aroused the fury of the mob as the fact of its perpetrator being a negro. White men have committed crimes as bad; some of them were lynched, some were hanged, and some after a brief term in prison were allowed to come forth to delight dime

museum audiences. No, we have here the old race question again—white against black.

At the time of the conflict between the two races in North and South Carolina, and the Pillager Indian outbreak in Minnesota, this question was much agitated and among the articles regarding it was an exceptionally good one by Francis E. Leupp, in the December *Forum*, in which he says.

"Is our attempt to civilize the Indians a failure? This is the question heard on every side since the recent so-called outbreak of the Bear Island Pillagers, a band of Chippewa Indians living on and near the borders of Leech Lake in Minnesota. Is our Caucasian civilization a failure? By the same token, yes."

A few days before the Indian trouble a white mob in the south lynched a negro; a few days after it a murderous riot occurred in the mining town of Illinois. The same impulse was at work in both cases and it was the same feeling which animated the Indians,—a desire to redress grievances. The only difference is the difference between the nature of a white man and of an Indian. The former, when wronged, acts upon the impulse of the moment and in a fit of rage avenges the injury of last night or to-day; the Indian, on the contrary, is slow to retaliate, nurses his wrath for years, adds the memory of the last insult to that of a previous one, his anger growing stronger instead of diminishing until some apparently trivial event proves the last straw

and we are horrified by "another Indian outbreak" and we begin to wonder if our "attempts to civilize the Indian are a failure."

Mr. Leupp has no desire to uphold violence or riots as a means of settling grievances, but in his capacity of member of the United States Board of Indian commissioners he doubtless saw the Indians side of the question and was desirous of being just to him. "Let us try to be just to the Indian," he says farther on. "Is it a sign of the failure of any scheme of civilization that under it race antagonisms survive, individuals usurp the functions of organized justice, and masses of ignorant men, despairing of any other means of resenting a supposed trespass on their rights, resort to blood-shed?"

Ought we, in short, to expect a higher standard of mortality from the Indian or the negro, who after years of injustice and slavery, have had a few years in which to grasp advantages that should always have been theirs, ought we, then, to expect more from them than from the white man, with his centuries of education and freedom?

May First. It is running a fearful risk to attempt writing anything in regard to the weather for a monthly publication. On a morning paper, where seconds count and everything goes up with a rush, it is possible to say something concerning the weather that will still be appropriate when the paper comes forth damp from the press. But on a monthly it is a risk; your spring poem may be nipped by an unexpected blizzard that comes along not on schedule time. But though the odds are against us, the temptation to say a few words of praise for the delightful spring days we are having, is too great to be resisted. The warmth of the sun brought leaves and blossoms out almost in a night. In the country the smell of burning leaves is in the air and the scent of blossoms, and there comes the languid feeling that tells us spring is here. It is a pleasure simply to be alive—to see the green trees and blue sky, and to watch the daily unfolding of fresh verdure. Certainly spring is the

most delightful season of the four. It is agreed that "anticipation is more enjoyable than realization," and the spring is but the anticipation or prophecy of the coming of summer, whose delights are alloyed by the thought of autumn's blight. Who could be miserable on a bright May morning? Certainly not the country dweller.

The first of May to city people is so intimately associated with prosaic thought of "moving" as to be almost divorced from the poetic sentiments. This year it brings to mind the name of Dewey, who achieved world-wide fame a year ago. There is talk of making the first of May a holiday in his honor—making it "Dewey's Day," but we fear there is shrewd practical sense as well as patriotism at the bottom of this idea as people can move and have a holiday on one and the same day.

The Curtis Letter

It was with great pleasure we noted the prominence given to irrigation interests in a recent issue of the *Chicago Record*. The letter of Wm. E. Curtis—about two columns in length—was devoted almost exclusively to the discussion of this important subject. The *Record* is the "people's paper" to such a great extent that any issue taken up by it is sure to be brought to public attention, and the mention made is therefore all the more appreciated. Under the department of "Pulse of Irrigation Industry" we quote extracts from this interesting article.

What it Should be.

The *Advocate and News* of Topeka, Kansas, has been succeeded by the *Farmers Advocate*. In the editorial announcing the change there are some good ideas as to what a farm paper should be. "We are of the opinion," it says, that what the farmer wants is not so much to be told how to farm. * * * * * Our idea of a good farm paper in something like a candidate for office with truthfulness added, a regular visitor to the farm home, telling the farmer what has happened outside in the world during the past week, watching his interests at points which he cannot reach, giving him an interchange

of views with other farmers, and becoming an indispensable companion the year round."

This is just what a farm paper should be—not simply a mass of theories as to farm methods written by some one who has, perhaps, had no practical experience on a farm and would hardly be able to tell a cherry from an apple tree except during the fruit season. The farmer is as well versed in his line of work as are men of any other trade or profession and what he needs is a publication which will bring him into more intimate connection with the rest of the world—do away with the feeling of isolation. The *Advocate* has adopted a high standard, but if it reaches it, it will become a model "farm paper." It is well, at any rate, to aim high.

A Good Motto. The epitaph on the tomb of Edward Courtney, Earl of Devonshire, is a sentiment which might be made a life motto for us all. It is as follows:

"Through the toilsome world, alas!
Once and only once I pass.
If a kindness I may show,
If a good deed I may do,
To any suffering fellow-man,
Let me do it while I can,
Nor deny it, for 'tis plain
I shall not pass this way again."

"Czar" Reed. The month of April marked the retirement into private life of Hon. Thomas B. Reed, who had so long been a familiar figure in the United States Congress that his reelection as speaker was considered certain. His resignation at the close of the fifty-fifth Congress was, therefore, quite a surprise. If Mr. Reed had served through the term for which he was elected last fall he would have been in the House of Representatives twenty-four consecutive years. He is now about sixty years of age and contemplates becoming a partner in a New York law firm, a business which he hopes will yield him a fair amount of money; something that his political career never did. Many men grow rich out of politics, but Mr. Reed is not of the number, and while he has, as most public men have, many enemies; while his autocratic

methods as speaker won for him the title of "Czar," he retires—voluntarily—into private life with a reputation for strict honesty and integrity, which even his enemies dare not dispute and of which any one might well be proud. He who can, amid the many temptations and opportunities of a political life, retain his honesty and remain "unbribeable" and uncorrupted is certainly a man of strong moral nature. After a political career of almost thirty years, Mr. Reed retires into private life—comparatively poor—that he may acquire a little money for his family.

Our Bankrupt Law. The present bankrupt law has been in operation about nine months now and diverse are the opinions held as to its value. It is claimed by some that it has been of great benefit to the honest business man of small means who became bankrupt, enabling him through it to start afresh. While it is thus a blessing to the honest bankrupt it will also enable many dishonest ones to take advantage of their creditors. Strictly speaking it is not morally good for us, since men become too prone to think their business obligations may be disposed of by taking advantage of the law, but it has certainly proved a wise measure in certain cases.

One writer, in discussing this subject, claimed that while the law was a needed measure at present and one that would prove beneficial to both debtor and creditor, he was in favor of having it repealed in a few years, and the assignment laws of the various states made as nearly uniform as possible.

"They Say." There are any number of people who are constantly wondering "what will they say?" And they live in dread of the great bugaboo—public opinion. They fear to do this or that because if they do they "may be talked about." And so they expend a vast amount of worry and often go against their better judgment on account of this bogie man. "People may talk," say these sensitive folks when some course of action is proposed. Well, let us suppose that people *do* talk; what of it? The people who have never made an enemy and név

been talked about, are not the ones who have made history. If you amount to anything you are bound to be talked about. If you fail they talk; if you succeed, jealousy starts evil reports, for while it is true that "nothing succeeds like success," there are many friends who regard your advancement as a personal grievance and their envy prompts them to "talk." To walk through this world in the midst of gossipers is like forcing your way amid briars; if you try to push them gently away you will get a great many more scratches than if you grasp them decidedly. Let sensitive folks take for their motto—"They say. What do they say? Let them say." Do what your own conscience tells you is right; make up your mind that no one else knows your capabilities, your aspirations, your trials and your temptations as you do yourself and therefore cannot decide for you; remember we must "build the ladder by which we rise;" and then if "they say"—let them say.

New Quarters. Whatever faults, either of commission or omission, may occur in this month's issue of the AGE must be condoned by our readers, for we have good and sufficient excuse. We moved May 2nd and this necessitated extra work, extra worry and much confusion. We therefore crave absolution this time and hope that in our present more commodious and convenient quarters we may be able to work to better advantage. Our number still remains the same—916 W. Harrison St., the move being from front to rear building only.

The Peace Conference.

Kipling's poem, "The Truce of the Bear," expressed the opinion of a great number regarding the peace proposal made by the Czar of Russia. It seemed somewhat incongruous for the universal peace idea to originate with the absolute monarch of a country noted for its despotism, and when first broached, last August, it occasioned much surprise and no little scepticism. Despite of that, the nations to whom the proposal was addressed, have all cordially responded and will be represented at the peace conference which is to be held at The Hague, May 18.

This will be as important a conference as the congress of Vienna, at which a body of men met to decide how they would divide Europe. The members of the conference will be invested with great representative authority and each nation addressed may send four delegates.

This is not to be, as it is often called, a "Disarmament conference," but a "Peace conference." Not a meeting to make changes in the present armaments of the world, but to make some plan, as yet not decided upon, whereby the great increase that is necessarily being made in the armies and navies of the world, may be checked. For the past twenty years this subject has been more or less agitated and many questions between nations, have during that time been settled by arbitration instead of war. What is hoped for, as the result of the forthcoming conference, is a permanent court, established by the twenty-seven nations, to decide on the various questions of importance which are constantly occurring between nations.

THE IRRIGATION PROBLEMS AND POSSIBILITIES OF NORTHERN WYOMING.

WATER SUPPLY.

BY CLARENCE T. JOHNSON.

The regions in which large streams have their source generally afford an interesting study. The Mississippi river and Red river of the North rise within a few miles of each other in a region abounding in lakes, from which one flows north and the other south. The St. Lawrence river begins in Lake Ontario above which the chain of Great Lakes furnish an endless and varied scenery regarding which the tourist wonders and the scientist speculates. Between Lake Ontario and Erie is Niagara, and in the same system lie the scenic features of Lake Huron, The St. Mary's river and Lake Superior.

The largest rivers of Europe and Asia begin in the highest mountains and are fed by glaciers or the perpetual snow of unknown altitudes and in such localities is almost invariably found the leading scenery of a continent.

In the North-western portion of Wyoming, among the Wind river and Absaraka ranges, is found the birthplace of three of the largest rivers of Western United States. The Colorado, Columbia and Missouri rivers here have their tributaries which begin where chance only determines whether the drainage goes to the Gulf of Mexico, the Gulf of California, or Puget Sound. That this region should abound in geysers, water-falls, canons, inaccessible peaks and rugged mountain chains is not surprising.

Among the tributary streams emanating from this portion of the Rocky Mountains is the Big Horn river, whose two most important tributaries—Wind river and the Shoshone river—rise within a few miles of each other. Wind river from its source flows south, thence east through the Shoshone Indian Reservation, after which it is called the Big Horn. The Shoshone river flows north, then turns north-easterly through the northern part of Wyoming and joins the Big Horn river near the mountain line. These two streams cut off from the high mountains all other tributaries to the Big Horn between them, except the Grey Bull river which heads near the source of the other two.

The Yellowstone, Snake and Green rivers are the other principal streams which drain this water-shed.

THE BIG HORN RIVER.

The Big Horn river, having a maximum flow of over 50,000 cubic feet per second, is the largest river in the state that can be utilized for irrigation. This volume of water would cover an area of one square mile 150 feet deep, or nearly 100,000 acres one foot deep, in one day, and if the entire discharge for that time could be utilized it would suffice to irrigate 50,000 acres of land.

It was gaged at Alamo, near the mouth of No Wood river, on the 21st day of August 1897, and discharged then 1,800 cubic feet per second. To show the discharge of streams gaged more definitely than can done by numbers alone, I have quoted the volume flowing in *well known* Colorado and Wyoming streams for the same day. In this way the discharge can be compared and a better idea can be obtained of the volumes the figures indicate.

On August 21st, 1897:

The Big Horn river discharged 1,800 cubic feet per second; the Arkansas river, 216 cubic feet per second, the North Platte river 717 cubic feet per second; the Laramie river, 100 cubic feet per second; the Poudre river, 265 cubic feet per second.

This measurement of the Big Horn river was made above its junction with the Grey Bull river which carried on that day 200 cubic feet per second, and the Shoshone river which discharged 510 cubic feet per second. This added to its discharge at Alamo increases the volume to 2,510 cubic feet per second.

WIND RIVER.

On August 29th, 1897, the discharge of Wind river, near Crowheart Butte on the Shoshone Indian Reservation, was approximately 1,600 cubic feet per second. On that day the Arkansas river discharged from 200 to 250 cubic feet per second; the North Platte river discharged 575 cubic feet per second; the Laramie river 70 cubic feet per second; the Poudre river discharged 258 cubic feet per second.

The land best suited for agriculture along this stream lies within the Shoshone Indian Reservation. Some of this land has been allotted to Indian settlers and they have not impaired the value of it for grazing purposes to any extent. No ditches have been taken out above Crowheart Butte, no buildings have been erected, no fences have been made. Here is an opportunity for a thriving community when the natural resources are intelligently dealt with. The water, the land, the timber and the power all demand to be employed in improving the natural conditions; but under present control the slow geological changes, only, will alter its appearance or value,



RESERVOIR SITE ON HEAD OF TEN SLEEP CREEK, BIG HORN MTS., WYO

SNAKE RIVER.

Snake river was gaged immediately above Jackson's Lake on September 5th. It discharges 147 cubic feet per second. This is above all of its important tributaries. When it crosses the Wyoming-Idaho line it rivals the Big Horn in size. On September 5th the Arkansas river discharged 184 cubic feet per second; the North Platte river discharged 575 cubic feet per second; the Laramie river discharged 70 cubic feet per second; the Poudre river discharged 165 cubic feet per second.

THE SHOSHONE RIVER.

On September 15th, 1897, the Shoshone river was gaged near Corbett, Wyoming. Its volume on that day was 360 feet per second. This discharge is the lowest that has ever been known. On the same day in 1897, the Arkansas river discharged 426 cubic feet per second; the North Platte river discharged 525 cubic feet per second; the Laramie river discharged 70 cubic feet per second; the Poudre river discharged 70 cubic feet per second.

In 1897, the streams draining this part of Wyoming were unusually low while rivers in the south-eastern portion of the state were correspondingly high. The Shoshone river particularly felt the effect of a light snow-fall in the mountains. However, in May its mean daily discharge was over 8,000 cubic feet per second and in June it exceeded 5,000. The June discharges would in one day cover 9,900 acres one foot deep or suffice for the proper irrigation of 5,000 acres one entire season, if impounded and utilized.

In thirty days with this volume flowing each day, 297,000 acres could be covered one foot deep or to contain it would require a reservoir covering nearly 6,000 acres 50 feet deep. This quantity of water would irrigate 150,000 acres.

WATER POWER.

All of these mountain streams have a large fall. Wind river is as fair a type as can be chosen. From the mouth of Warm Springs creek to Crowheart Butte is a distance of 46 miles. The total difference in elevation between these two points is 1,775 feet, or 38 feet per mile. Sixteen hundred cubic feet per second with this fall would furnish nearly 7,000 horse-power each mile. At high water this would be increased to exceed 150,000 horse-power per mile. In this small portion of the river there goes to waste at low water 322,000, and at high water 6,900,000 horse-power.

The Shoshone river, excepting the canon through Cedar Mountain, has an average fall of 25 feet per mile. Through the canon it falls 100 feet per mile.

The lowest discharge of the stream, or 360 cubic feet per second, would furnish 1,025 horse-power each mile, which, in the canon,

would be increased to 4,100 horse-power. In May, 1897, 23,000 horse-power could have been utilized outside of the canon each mile, or 92,600 horse-power each mile.

There is no lack of favorable places for dams on either of these streams, nor is there a scarcity of material from which dams could be constructed.

The elements lacking are a serious impediment to rapid growth. There are no cities to light or heat, there is no crying demand for electric rail roads and there is no raw material for mills and factories to work upon. Before a fractional part of this power will be utilized, beyond that required for a few saw mills, which will furnish lumber to a local market on the head-waters of the stream, agricultural development must be made to give it value.

DEVELOP OUR OWN RESOURCES.

BY O. H. CURTIS.

That God formed this great earth as a source of sustenance for all His creatures living upon it, no one will for a moment deny. It therefore follows that upon its surface, or within it, can be found everything desirable for the true needs of all the beings now existing here. This fact, then, proves all that is necessary is that the resources already placed here should be thoroughly developed and carefully utilized in order that every creature be supplied with all his personal wants. The question then arises, are all resources being now faithfully developed by mankind everywhere to the best advantage, and if not, what can be done in order to bring about this great result? Unquestionably each region should be utilized to produce whatever its own natural resources will best accomplish, for then the desired result can be attained with the least cost of labor.

No result in life is reached except at the cost of effort on the part of someone, which is perfectly right and just, but that labor is oftentimes lessened by the inventive genius of someone else, who produces appliances that make the work more easily accomplished.

It is largely through this means that the present generation so greatly excels those preceding it, and the future will undoubtedly show far greater surprises than have been seen anywhere in the past ages of humanity.

We are, of course, most interested in the prosperity of our own grand country, and the thorough development of all its resources, and we are constantly seeking new means whereby this desired result can be more easily and quickly accomplished. This attribute and tendency of our people is wherein we chiefly differ from the inhabitants of all other countries, and the results are seen in those departments wherein we excel all other nations.

Look back in history only one short century, and compare the condition and wealth of our country then with the various nations of the entire world at that time, and we must admit that we were indeed weak and insignificant as compared with the rest of them. From almost nothing at that time, in only one short century we have outstripped the other nations, some of whom were already several centuries old when ours began, until today we stand far and away the wealthiest nation now existing upon the face of the whole earth. Our nation's value is now estimated at over \$80,000,000,000 or over \$1,000 for every man, woman and child in our whole country. Only a few

days ago every nation was astounded at the fact that our country at that time controlled the finances of the whole world.

What, then, has been the powerful cause whereby our people have made such wonderful growth and so far outstripped the older nations, that heretofore have always possessed the controlling wealth of the world? We have accomplished it by quietly developing the almost exhaustless resources of our country, and utilizing the natural products in manufacturing different articles needed by humanity in various parts of the earth. We have been greatly aided in their manufacture by the inventive genius in which our people manifestly excel all others, thus enabling us not only to overcome the obstacle of cheaper labor in other countries, but to produce really far more excellent goods and at decidedly a less cost than any of our competitors. These facts of our superior skill and energy in developing and utilizing our natural resources, have brought our nation from mere nothing to the point whereby our exports in 1898 considerably exceeded those of every other nation in existence and were just about double the amount of our imports.

This wonderful attainment was accomplished in the face of decided hindrances to success in many ways. Not having our own merchant ships we are still compelled to use those of foreign countries, chiefly our direct competitors, thus not only paying them about \$100,000,000 each year as freight for carrying our goods, but having them everywhere to influence the trade away from us if possible, and into the hands of the manufacturers and dealers of their own country. Not only has the vast influence of the shipping interest in all foreign countries been against us, but also the gigantic interests of the entire producing, manufacturing and selling elements of the various nations all over the world. This commercial rivalry has already become so strong that the jealousy of the people of certain European countries has been very bitterly manifested against our own nation, and we are justified in looking with a large degree of apprehension as to what this feeling may cause the future to have in store for us. Certainly we ought not for a moment to lose sight of its existence, but should begin now to prepare for its possible developement, instead of our remaining satisfied with our marvelous attainments, and being puffed up and satiated by our present success.

Common prudence demands that we immediately begin to remove the hindrances to our commercial success, by the rapid building of our own ships, both for merchant marine, and for a navy sufficient to thoroughly protect all of our national interests everywhere, no matter what the future may have in store for us. Nor should we allow ourselves to be deceived by the flattery any nation gives to us because it is not at present able to fully combat our success, while all the time it is intriguing with others, so as to ultimately overcome us, hiding its preparations under a plea of desired peace.

As the past success of our nation, in the face of all obstacles, is the result of our energetic development of our natural resources, and as that work in reality is comparatively just begun by us, we should embrace every means that we can discover which will in any way aid us in this work, either in the more rapid development of all resources, or in their more profitable use and distribution among all mankind.

As a great aid to their distribution, a canal should be built at once, with national funds, from the Hudson river to Lake Erie, so that ocean ships can at all times freely sail to all the ports on our Great Lakes. This would so reduce freights that the market price on all produce would be raised to the extent of at least twenty cents per bushel on all grain, and to a corresponding degree on all other products, stock, fruits, ores, and all manufactured goods, that are now or could then be produced within the whole territory of the entire northern half of our country, thus greatly benefitting every farmer, merchant, manufacturer and laborer of every description.

Of all the vast resources of our country, far the greatest in value are those arising from the development of the soil, in agriculture, stock, poultry and fruit raising and kindred industries. But this work thus far has been very imperfectly done, from carelessness in trying to work on too large a scale. Land has been too cheap, thus each family has so much they do not thoroughly work any of it. They think they must work all they have, so they simply skim over the surface and do not at all, or sufficiently, replenish the soil from year to year, as the crops are removed. Thus it soon requires all the land a farmer has to produce the crops his present needs require.

This is all wrong. Look at the farmer in the old country and what he still produces from each acre, although his land has been under constant cultivation for many centuries. As good or even better results can be obtained everywhere in our country, if the same care and attention is given to the work. Another, and perhaps greater, evil arising from the system in our country, is the false ideas instilled into the minds of each rising generation, for they are led to believe it is now necessary to have more and more land in order to live, with their present enlarged ideas of their needs, or rather the false extravagance of their tastes. These exaggerated ideas of false needs, like everything else, have grown from their constant cultivation, until now there are scarcely any children of the farmer, except, perhaps, those of foreign descent, who are content to continue life upon the farm, for they consider such a life to be beneath them, and are not satisfied until they join the mad throng in our cities, where they delude themselves into believing they are better off, even when cooped up in one small, hot room, breathing only foul poisonous air, eking out a bare existence upon the intensely small salary which they

are really fortunate in receiving, and perhaps afterward becoming one of the many thousands of unemployed, existing or starving as the case may be. They soon learn what real care and worry are, and become slaves to it, along with the other misguided mortals who have left pleasant homes on the farm, where the pure air of heaven is ever free to all, and refreshing slumber every night fully prepares the body for the duties of each coming day, and where care and anxiety need never come, if each one has rightly performed the farm duties; and that is all they ever need to do, for God then gives the increase and full reward for all their labors.

The farmer's son has little real show for success in business in the city, as statistics for many years past prove that more than ninety-five in every hundred fail sometime during their business career, thus suddenly losing in a moment all the results of their former savings from years of labor, care and worry. On the other hand, scarcely ever does a farmer fail and lose his savings, even with the present careless system, but one could never fail, if he were half as thorough in all his work of farming as he should be, and as the merchant, forced by competition, is compelled to ever be. Someone is always ready to pay cash for everything the farmer may produce, and at the full market price, while the merchant must ever seek his customers, and after awaiting their coming, must then accept less than the goods are worth, because some unprincipled competitor has offered similar but inferior goods at a lower price, and may be then getting credit instead of getting cash.

What, then, should be done in order to change the tastes and ideas of the children, so as to make them not only willing, but desirous of continuing in the life of a farmer. First make that life show more of pleasure than of poorly rewarded labor. How can it be done? By using the same care and study of means and results, backed up by as good an education, as is now used by the successful man in our cities.

This will immediately result in all work upon the farm being thoroughly done, and only such amount being worked as can be thus handled, resulting at the end of the season in a minimum crop-yield of forty or fifty bushels per acre instead of a maximum of five to fifteen bushels per acre as at present, thus rewarding the farmer at the same cost, except a slight increase in seed, and the expense of harvesting and his own labor, with a profit at least four times greater than he now receives.

This in itself would at once increase the possible number who could become engaged in this grandest of all employment, and everyone would receive a better reward for less real labor, than he can now possibly receive, from the position he might get in some city. This would also allow him to take the proper amount of time for study and mental improvement, and for needed recreation. His

knowledge should cause the farmer to practice the proper rotation and diversity of crops, together with stock and poultry and fruit raising, with special care and attention toward the recuperation of the soil. There is every reason for the farmer to be fairly educated, not only in things directly pertaining to his work, but in all the common branches, and as many others as his tastes and time may warrant. For this purpose a system of education should be established everywhere, suited to his special needs. In connection with each state university there should be a department, with at least one thousand acres of land, where the most practical as well as scientific ideas of farming would be fully taught, and everything be freely demonstrated and practiced by all the students upon the land at the college. Besides this means, there should be owned by each county, at least one section of land centrally located, with its entire management directly in control of the state department at the university, upon which additional students could be freely taught. A system of appointment free from all political influence, should be established in each state, whereby students would receive free instruction and practice at the state department to the number of two students from each county each year, and at each county department to the number of two students from each township yearly.

Large circulating libraries at each county department should be established, the books to be loaned to all farmers in the county. By these two means and various others of public interest, the entire farming class could soon become educated, and farm life be then considered not simply creditable, but honorable by everyone, whether engaged in it or some other vocation. Particular attention should be given by all farmers and entire communities, as to the especial qualifications of their land to the raising of some particular crop. As for instance, in the state of Nebraska, two large sugar factories have for years, proved the soil and climate of that state, to be superior to all others in the raising of sugar beets. Therefore such inducements should be made as would result in the required amount of beets being raised in this region, as will produce the sugar required by the people of our whole country, even if we do not ultimately export some, so as to entirely cease importing raw sugar from foreign countries, as has been heretofore done to the amount of \$100,000,000 annually. Not only would this vast sum of money be kept at home here, but this additional amount, would thus be paid out for labor of various kinds.

The same attention in the South should be paid to the raising of rice, that we may avoid importing that. The same is true of tobacco and several other products, the grades of each being by care and study improved, until the desired perfection is reached. In this way, by turning our attention to the producing in our own country, of every thing which is possible, we not only avoid sending our money

out of the country, thus building up some foreign competitor, but by thus increasing the variety of our products, we by that much reduce the chances of our production of any one kind. Alfalfa, the wonderful fodder plant, should be far more generally utilized, especially in all regions where other kinds of grass do not successfully grow, but its culture will amply pay in almost any region, even in direct competition with other leading grasses.

Another means of success, far surpassing all past results in farming, lies in proper irrigation, by a system which will always supply the water as it is required. Its advantages have already been proved beyond possible question, in various parts of our country where the natural rainfall is not sufficient. Especially in the Pacific Coast states, and in some other regions, has it been thoroughly tried, and the result is the finest fruits, wheat and various other products, that are grown anywhere in the whole world. Compare the results of irrigation on the wonderful soil of Nebraska, which, near Ord, produced a yield of 105 bushels of barley to the acre. The work in this state is comparatively new, and only in the western part has the lack of rain seemed to make it necessary, but enough has already been done in the central part, to prove that whenever it can be done in any state, irrigation will fully repay its cost, in the increase of crops that it always produces. At Green River, Utah, in the very heart of the wilderness, where nothing grows except now and then a scraggly sage bush, is fully demonstrated what irrigation from an artesian well will do. Three years ago fire removed every vestige of civilization. Since then a row of cotton wood trees around the grounds of the railway eating house has been produced, each one of which now measures six inches through and sixty feet high. In the garden are grown all the vegetables needed for the table and in quality they easily excel those shown at the county fairs throughout the Eastern states. Five crops of Alfalfa are cut during one season.

The results are simply marvelous, and beyond the belief of those who have not actually seen them. Irrigation is bound to revolutionize the entire agricultural interests of this country, and the sooner the work is begun the sooner the reward will follow. United effort to that end should be made not only by different local communities, but by the various states as such, and the general government also, giving every aid possible by legislation, and the free appropriation of money when the desired result can be thus sooner attained. In regions where running water can not be utilized to better advantage proper wells should be sunk. This can be easily done, as is already proved in several states, for instance Wisconsin, the Dakotas and elsewhere. Each state has various streams that by proper storage systems, can be advantageously utilized to irrigate the greater, if not the entire portion of soil that can be used for farming. The various

private wells will do the rest. Our general government should provide the money and at once begin the work which will ultimately reclaim and put into use the 550,000,000 acres of arid lands which are now so useless, simply from lack of water.

An annual appropriation equal to one-tenth the amount in the river and harbor bill, would probably be sufficient and a complete system of fixed reservoirs should be built so as to provide sufficient water at all times. Such a low charge should be made to the settler for the water, as would, during a long period of years, simply repay the government for the actual cost of the work already done. The government can well afford to be exceedingly liberal with those actual settlers, who, by the aid of the water furnished, shall reclaim this land that is now entirely useless, for the added products will benefit the whole nation, far more than the amount of expenditure. Here is a department, wherein the general government should, far more than in any other, freely spend its money, for ample and direct returns are sure to come, far in excess of the amount spent. But the individual farmer should not continue idly waiting for the general government, nor the states nor even his community, or some large corporation, to raise a large sum of money, and build a vast system of works for irrigation, in any region that is now partly or thickly settled, in the older or some of the newer states of our grand union. Each and every individual farmer should turn over a new leaf, and till his soil with a new energy, and increased thoroughness, plowing deep into the sub-soil which will give him added moisture, then by adding fertilizers and continued thorough work, he will increase his crop from two to four fold. If then the natural rainfall in his region proves insufficient, to crown his own thorough efforts with proper success, let him utilize the supply of water everywhere stored or flowing beneath the surface of his own land, and by means of wells, let him bring it upon the surface and distribute it over his soil thus irrigating it to the extent necessary to insure success.

This can be done at small actual expense, by means of windmills, thus utilizing Nature's own means, wherever the flow or body of water lies near the surface as is the case in most eastern states, and especially in western Kansas and Nebraska, where the entire surface of this dry upland is underlaid by the so-called Tertiary water deposit, which extends from the Rocky mountains east to the Missouri valley and in most places at a depth of about fifty feet below the surface. This deposit is already tapped by more than 2,000 wells, each of which irrigates a few acres, and its inexhaustible supply is proved by the Hutchinson Packing Company, who, from a space 150x150 feet, are pumping daily, 5,000,000 gallons of water, with no apparent effect upon the supply. This is pumped from a depth not exceeding forty feet and is enough to cover 6,000 acres to a depth of one foot each year. Beside this Tertiary supply, is another,

the Dakota sandstone supply, which comes near the surface in the centre of Kansas, and from there, extends at a depth of 200 to 1,000 feet below the surface, towards the north and west, underlying a region 1,500 by 500 miles to the "Hogback" ridge of the Rockies. The supply is an inexhaustible ocean, and lies between a layer of shale rock, both below and above it. It can of course only be reached by artesian wells, many of which are already in active use in both of the Dakotas. With these two vast sources of water supply, known to exist underneath this large area of now arid soil, what shall be the means, within the reach of the farmer, whereby they may be utilized? Why not harness the war moving wind, that without limit constantly blows across this whole region? By applying it properly to pumps and wells at needed points, it can be done with no cost whatever for the motive power itself.

Here is a field for the inventive genius of our people, and he who best solves the problem, will not only become rich, but will at the same time benefit the most important class of humanity. Some of the farmers in Nebraska have proceeded fartherest in this direction in their crude way, and manufactured, from materials they could find about them, windmills and pumps at the very low cost of \$6.00 to \$8.00 each which now are indeed very common in some parts of that state. Perhaps the most remarkable of these is one at Kearney which cost only \$1.50 and is six feet high, nine feet long and three feet wide and has eight fans. Another one at Lincoln nine feet wide, thirteen feet long and thirteen feet high cost only \$8.00. This irrigates five acres of garden land.

The largest and best known "Jumbo" mill, is owned by John Tannahill, a market gardener at Columbus, Neb., and it not only fully irrigates ten acres of garden, but has made a large growth of fine trees all about his place, some of which are a foot through and sixty feet or more in height. In the plan of irrigation by diverting the running streams, Nebraska leads, and its laws are liberal to the farmer. Over 2,500,000 acres are now reclaimed by this means, at a cost of less than \$2.50 per acre, and it has already resulted in an increase of value to the land, of over \$9.00 per acre, a net gain of \$6.90 per acre, to say nothing of the gain in the crops besides. By this means sixty-five bushels of corn per acre is raised when adjoining fields not irrigated yields only thirty bushels. H. J. Hendryx, of Platte Co. has twenty-five acres of celery which netted him \$125.00 per acre. Another farmer raised 1,365 bushels of onions from one acre irrigated, the largest of which weighed nineteen ounces. His neighbors raised only 100 bushels per acre without irrigation. Mr. Sailing of Cozad, irrigated his wheat, only applying water twice, which gave him a yield averaging 40 bushels to the acre, while all about him land not irrigated, produced only twenty to twenty-three bushels per acre.

These examples are cited to show the decided effect of additional water alone, and they prove that irrigation pays the farmer, not only in the arid region, but also in all regions where there is at all a shortage of rainfall. One windmill will fully irrigate six acres of land which farmed intensely or properly will easily support a family of five persons. Added wells and windmills upon a farm will correspondingly add to the profit of farming, without corresponding increase of labor on the part of the farmer, though some must be of course added. Where one animal can now be fitted for market, with irrigation and little if any labor, at least five can be sold. There is no question then, that if the farmer will intensely and thoroughly cultivate, such a portion of his land as he is able thus to do, replenishing its strength by proper fertilizers, and furnishing it with sufficient water, he will be rewarded by profits, from two to four times as great as are now ordinarily received, and that too by very little added labor on his part, and but a slight increase of cost of seed and other expenses. Thus soon, with increased leisure, and steadily added wealth he will prove to all his children, the evident truth of the fact that farming is the most independent livelihood and gives the surest profits, of any vocation known.

PRACTICAL IRRIGATION.

BY JOHN G. HALL.

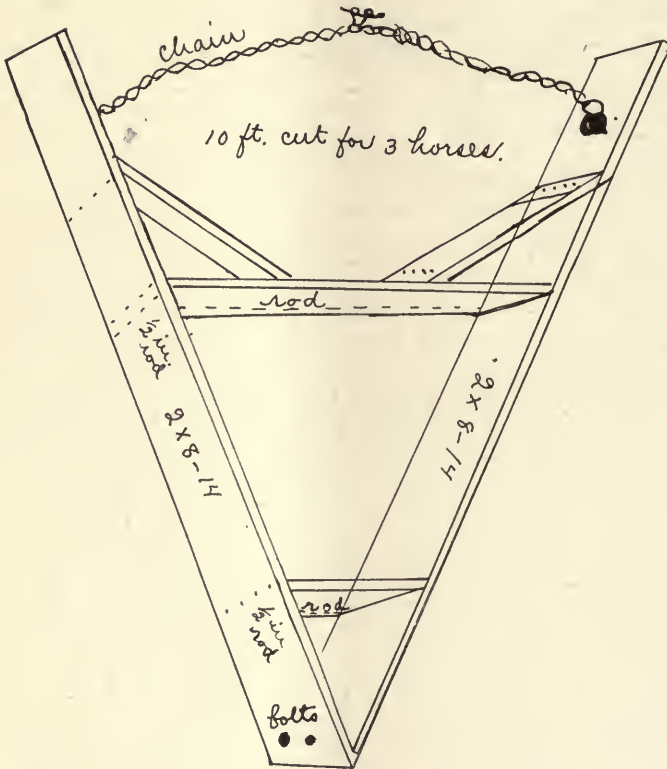
I have often looked through the columns of the AGE for articles treating upon practical irrigation, but find they are very scarce, so I shall endeavor, from time to time, to write upon this subject as practiced at Greeley, Colo.

Greeley is a town of about 6,000 inhabitants founded by Horace Greeley in 1870 and is still governed by the original charter of nearly thirty years ago. It was a temperance town from the beginning, and doubtless will remain so, as the charter is renewed from time to time as it expires. On this account many people come here to rear and educate their children. The state normal is located here; large public schools in the various parts of town, making our school system equal to the best. The town is wholly supported by agriculture. The water for irrigation is taken from the Cache La Poudre, the South Platte and the Big and Little Thompson rivers. The largest proportion coming from the Cache La Poudre. The soil is a sandy loam. Principal products are potatoes, small grain and alfalfa. Greeley is considered to be (by those who have traveled extensively) the garden spot of the United States, as the products raised by irrigation amount to several millions of dollars annually. Greeley potatoes are superior to any grown. The amount grown each year averages eight to twelve thousand cars, and they are shipped to all parts of the United States. In the fall and early winter solid train-loads of potatoes leave every day by the U. P. and Gulf roads. Land in this locality sells from forty to one hundred and twenty-five dollars per acre; this includes water belonging to said land. The variation in valuation depends on location, improvements and the ditch by which the land is watered, as some ditches have priority of right. The snow falling in the canons of the Rocky mountains thirty miles distant, help to supply the rivers, melting gradually, and when not needed is stored in reservoirs until wanted. Surface leveling is a most important factor in successful farming by irrigation.

During the eighteen years of my experience here at Greeley, the question of leveling the surface, so the water can be spread easily evenly and uniformly, has been a grave one and one calling for the constant care of the progressive farmer. Many devices have been tried with more or less success. The most successful and now being adopted pretty generally is one known as the Hall leveler, invented by myself.

This leveler used on freshly plowed land does its work to the entire satisfaction of the user, as it loads itself from the elevations and

deposits in the depressions, constantly loading and unloading itself as it is drawn along. Being fourteen feet long, the ends rest on the high ground, the dirt is carried along nearly in the center until a depression is reached which fills level with the general surface, the balance being carried on to the next depression, and so on, until a



general flat surface is obtained. But this is not the only reason a leveler should be used. Running the leveler over newly plowed land forms a crust on the surface, thus preventing the sun and wind from penetrating the soil and absorbing the moisture that should be retained to germinate the seed. The accompanying cut is self-explanatory.

LET'S HANG TOGETHER!

A POLICY THAT THE WEST SHOULD UNITE ON

BY GEORGE H. MAXWELL.

"If we don't hang together we will all hang separately." These wise words of advice which have come down to us from the good old revolutionary days, may well be taken as a guide by the people of the West in the solution of some of their western problems.

For many years the development of the west has been retarded because there was absolutely no policy or legal system adapted to the utilization or administration or disposition of the vast area of public lands in the arid region. The immensity of this great domain may be conceived when we take into consideration that the area of public land not taxable comprises 76 per cent of the whole surface area of Arizona, 57 per cent of California, 64 per cent of Colorado, 89 per cent of Idaho, 78 per cent of Montana, 95 per cent of Nevada, 69 per cent of New Mexico, 81 per cent of Utah and 85 per cent of Wyoming.

Among the people of the West there have been two hostile factions, representing apparently the opposing sides of an "irrepressible conflict," as to the policy which should prevail in the disposition of these lands.

One faction has contended that the lands should be donated to the states outright, the federal government surrendering all interest in them, and leaving the states to work out their own salvation.

The other faction has contended that this policy would be destructive of the best interests of the states themselves, resulting in the lands passing into private ownership in immense tracts, creating land monopolies as detrimental to development as the old Mexican grant system, and that in short it would retard the reclamation and settlement of the arid west for generations, if not forever.

The sentiment of the east has been opposed to state cession. The people of the east have regarded these lands as the heritage of the whole people, and have considered, and why not, that the government had no more right to in effect donate these lands to the stock growers of the west than it would have to donate the live-stock of the west to the people of the east.

In some of the grazing states a public sentiment has been created in favor of state cession, but the sentiment of the west as a whole is not favorable to it, but is voiced by the editorial policy of such leading

western journals as the *San Francisco Chronicle* and the *Los Angeles Times*.

Not long ago the *Chronicle* said editorially, in the course of an article on this subject: "Land given to states is generally turned over by hook or by crook to private speculators. There are few instances where any other result has followed, and on that account the state land-grant proposition is very popular among legislators and lobbyists who believe that the public owes them a living."

The *Los Angeles Times* republished this article in full, and in commenting on it, among other things, said:

"Bitter experience has taught the people of the United States that such grants, made to states, are almost invariably the source of corruption and scandal. We have enough of that sort of thing at present without inviting more trouble."

Now is there a ground upon which those which hold these conflicting views can and should unite to start the west forward on a new era of development? Undoubtedly there is—and one which would remove every existing evil of the open range and at the same time guard against the greater evils which it is feared would result from state cession.

The key note to such a solution has been struck by Elwood Mead, formerly state engineer of Wyoming, and now consulting engineer to the Department of Agriculture, in an article published in *The National Advocate* of January, 1897, and by F. V. Coville, the botanist of the Department of Agriculture, in an article published in the *Forum* of September, 1898. The solution is this:

That the grazing lands should be leased, and the revenues devoted to the construction of reservoirs and irrigation works and the reclamation of the irrigable lands.

In his first article Mr. Mead advocated the cession of the lands to the states and the leasing of them by the states. But Mr. Coville took the ground that it was unnecessary that the government should give away the lands in order to establish this system, and in his last Biennial Report as state engineer of Wyoming, Mr. Mead said:

"The principal reason for advocating cession has been the desire to put an end to range stock controversies which threaten domestic peace; to render irrigated agriculture more profitable, and to secure for the state the funds needed to aid in building large canals and extensive reservoir systems. But all states are not equipped as is Wyoming with a land department for the management of leases, or an engineering bureau for the construction of public works, and in the states differently situated it has been proposed, as a substitute for cession, that the general government should inaugurate a leasing system for the non-irrigable grazing lands to be handled by the general land office in connection with its disposal of the lands which can be farmed, the funds arising from such leases to be expended in

these states in building canals and reservoirs for reclaiming the irrigable land. *I see no reason why this could not be done and why it would not be an immeasurable improvement over the lack of management or control which now prevails.*

"It is not a question of securing title to the land which is important but the inauguration of a system which will preserve the native grasses from injury, if not destruction, through overstocking the range, and secure the conservation and best use of the waters of our rivers which now run to waste."

Why is not this last clause, quoted from one of the ablest advocates the policy of state cession has ever had, the ground upon which the whole West can unite, and bury the hatchet among themselves, and go before the people of the East with a proposed policy which obviates every evil of state cession, accomplishes every good result that could come from it, and to which no reasonable man can suggest any reasonable objection which cannot be removed by a wise adjustment of the methods to be adopted for carrying the policy into effect.

Just so long as those who have advocated the cession of the lands to the states, and the surrender by the federal government of all control over them, transferring them absolutely to the State Legislatures, continue to insist on this policy and demand the absolute cession of the title by the federal government, just so long will the "irrepressible conflict" continue, and the development of the West be retarded, for absolute state cession will never prevail. There are too many, both east and west, who will heed the warning voice of such journals as the *San Francisco Chronicle* and the *Los Angeles Times* whose opposition to state cession is the result of a knowledge of past experiences with state land-grants and springs from a deeply rooted belief that such a policy would be detrimental to the best interests of the West.

FARMERS' HOMESEEEKERS' LEAGUE DEPARTMENT.

In Charge of J. HAMMOND.

Mr. H. E. Lait, of Winnipeg, Manitoba, inquires where we are going to locate. In reply I would state that this is a matter for the colonists themselves to decide. The promoters of the Farmers' Homeseekers' League have assumed simply the duty of bringing a sufficient number of homeseekers together to form a strong and powerful colony—such a one as will be able to found a successful and prosperous community. When we shall have done this our duties cease. The homeseekers will then organize themselves, and as a corporation will examine the various propositions of suitable locations and decide the question where the colonists shall establish their homes.

Among the propositions received so far there are two from Arizona, two from New Mexico, three from Nevada, one from Washington, one from Utah, and last though not least, a very attractive one from Cuba, the Pearl of the Antilles.

Brother Jno. Gorton, of Litchfield, wishes to know how the funds will be laid out. This is also a matter with which the association of colonists will have to deal. It will be for us to discuss when the time comes whether it were better to place our share of the expense of establishing the colony into a common fund, or whether the plan should be adopted of each man handling his own money. Either plan, under certain limitations, could be made practicable without sacrificing, to any great extent, the advantages we expect to derive from united action and co-operative effort. Thus, for instance, we can buy the provisions for the entire colony in bulk, and altogether, and it will make but very little difference whether the payment be made out of a general fund or we collect together the requisite amount from the individual at the time of the purchase.

Correspondence during the present month clearly reveals an inclination on the part of intending members to hold back their names until they see how we "get along." This is acting somewhat on the principle of letting somebody else make the pie, and when he has it nicely baked, come in and help him eat it. We ask such brothers to kindly reverse their policy and lend us their assistance in making the pie, whether they decide finally to have anything to do with the eating of it or not. When a brother homeseeker hands in his name we do not ask him to pledge himself to any course of action what-so-ever. He may stay with us if the developments of the movement are satisfactory, or he can withdraw at any time if they are not. Until incorporation of the colony no responsibility, financial or otherwise, will be incurred by our members. Do not hesitate to at once send in your name and besides that do all you can to bring our scheme to a satisfactory issue.

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs. Also sketches or plans of convenient and commodious barns, hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us improve the appearance of THE AGE?

CHINESE AGRICULTURE.

Under the above title Wm. N. Brewster gives a very interesting account of the way things are managed by Chinese farmers—Mr. Brewster has charge of the Methodist mission work in the district of Hinghua, China, and from his labors in this line has had abundant opportunity to become intimately acquainted with the every day life and work of the Chinese. In the article which appeared the *Farm and Fireside*, Mr. Brewster said as an introduction that “in order for the American farmer to understand how the Chinese cultivate the soil it is necessary first to understand something of the conditions of life here in southern China. In the first place, the population is so dense that land is very expensive. Fertile fields, with plenty of water, near a good market, and where the owners can watch them against thieves, are worth to the owners prices that seem like the fictitious values of corner lots in a booming western town in America.”

Continuing he says: “As I write I am passing by fields that will bring \$600 (Mexicans) an acre. The owners of these fields have them worked for ten cents a day, or about \$3.00 a month. That is, an acre of ground represents the wages of an ordinary day-laborer for two hundred months, or nearly seventeen years. Of course, all land is not worth so much as

that; much of it will bring not more than half that, or even less; but good rice-land, well located, is commonly valued at that figure, or even more. A laborer or the farm in America wants at least \$1.00 a day. Very little farm land without improvements is worth \$100 an acre. The laborer can earn an acre in three months as easily as the Chinese coolie could earn it in seven times that time.

It goes without saying that where land is so valuable it must be made the most of by the cultivators. There are no unsightly rail fences meandering about over the face of the earth, taking up as much space as a turnpike ought to. In fact, there are no fences at all. There are high earth and brick walls around houses, and sometimes orchards are thus closed in, but never fields. They have no barbed wire for fences, and a wall would not only occupy space, but would shade the ground, besides costing a large sum to build it and keep it in repair. How do they keep the cattle out of the grain? This is simple enough. They keep them in the house, not the stable. I have never seen a stable in China. No cattle would stay there long, if locked up in a building by themselves; thieves are too abundant. When a cow or ox wants to graze, it is led out by one of the family, and led back again after nipping tufts of grass on the canal bank or the roadside

Except upon the mountains there are few, if any, fields for grazing. They cannot afford to grow grass upon land that will produce rice or sugar-cane."

Land in China, owing to its being in the latitude of Key West, can be cultivated all the year round. The greatest economy in space is used, enabling a dense population to live on a comparatively small tract. They consider a half an acre a large field, and it is so well tilled that weeds have no chance to grow. While this economy is well enough in one way it is wasteful in another as the roads are too narrow to admit of anything but foot passengers, necessitating the carrying of all produce to market on the farmers' backs.

In conclusion Mr. Brewster contrasts the lot of American farmers and says: "The American farmer is not always contented with his lot. Too often the complaint is of short crops or nothing for good crops. Life's joys and sorrows are largely in contrasts. What is hardship to the rich is luxury to the poor. One season's experience of the Chinese farmer for the most discontented American king of the soil would send him back to his native land thanking God for the easy life of abundance given him in a Christian land, more favored of Providence than any other under heaven. If the American farmer had to keep his live stock, chickens, cattle and pigs, under his own roof in order to keep them from being stolen; if he had to watch his fields every night as soon as the grain began to turn, or the fruit to ripen, or the potatoes large enough to eat; if he had to harvest it with a flail, and carry it to market upon his shoulders; if the price of land were so high that to buy even an acre of it was a hopeless task; unless he had inherited wealth, or made a happy stroke in business; if he had to pay twenty-four per cent. interest if he was so unfortunate as to have to mortgage his land; a few months of such experience would send

him back to "God's country" contented with his lot. It is the difference between Christianity and heathenism."

RULES FOR DAIRYMEN.

The Illinois agricultural experiment station bulletin of recent date, discusses the very important subject of milk and its impurities, bacteria, etc. The lesson to be learned may be summed up in the eleven rules that it gives for dairymen, and though many a farmer will laugh at some of them as evidence of "over niceuess," if he lived in the city where milk often sours in less than six hours after the milk man brings it, in the summer weather, anything that tended to keep it sweeter and purer would be welcome. The rules are as follows:

1. Keep the cows clean and wash the udders before milking.
2. Keep the barn clean, with walls and ceilings whitewashed; have it well lighted, ventilated, and free from dust at milking time.
3. Always make a clean toilet before commencing to milk.
4. Keep utensils clean and bright.
5. Remove the milk from the stable as soon as drawn and strain and cool at once.
6. Never expose milk to bad odors.
7. Do not mix fresh warm milk with that which has been cooled.
8. Give the cow only good, wholesome food and pure water.
9. Never add anything to milk to prevent its souring. Cleanliness and cold are the only preventatives needed.
10. Milk regularly, quick, quietly, and thoroughly.
11. Always treat the cows kindly and never excite them by loud talking, hard driving, or abuse of any kind.

England pays Denmark more than \$20,000,000 annually for butter. Having educated her people to become expert butter makers through her experiment station and dairy school, Denmark next

undertook experiments in feeding pigs and the curing of bacon and other pork products. Since 1880 more than \$50,000 was expended in this one line of effort, and the best scientific talent of the country was employed. Until Prof. Henry's work on "Feeds and Feeding" appeared, these extensive and invaluable experiments were not available to our people because they were printed in the Danish Language. In this book of Feeds and Feeding Prof. Henry has devoted a whole chapter to the Danish pig feeding experiments.

THE VALUE OF DUST.

"If it wasn't for dust," said Prof. Wiley, the chief chemist of the agricultural department at Washington, "man would have to devise a new plan of existence; he would be compelled to provide himself with food by some other means than agriculture. You could not have a garden or a farm without dust. It would not be possible for a crop to grow unless the soil contained an organism capable of converting nitrogeous matter into nitric acid. Nitrogen is indispensable as plant food, and plants can assimilate it only when presented in the form of nitric acid, commonly known as aqua-fortis. That is incapable of auto-locomotion and can be distributed only through the dust which falls upon the soil and upon leaves of trees and plants. Hence dust is essential to the pursuit of agriculture, and if it wasn't being carried about constantly on the breeze through the air we would simply have to quit farming; animals would have nothing to feed upon, and we would have neither meat nor bread nor vegetables.

"I have been spending some years," continued Prof. Wiley "in the investigation of the agricultural value of dust, and it is a very important subject. The soil is continually being revived and enriched from the particles that are floating about in the atmosphere. They come from two sources; first, atoms of the earth's surface caught up by the wind and distributed elsewhere, and, second, what we call

cosmic dust—that is, mineral matter of meteoric origin.

"We are getting gradually to understand its quantity, its value and the important part it plays in agriculture. The heavenly bodies are constantly shedding fragments of iron and other mineral substances, which fall with great velocity, and when they reach the atmosphere that surrounds the earth are heated by friction and catch fire by contact with the oxygen. They are then burned to ashes and scattered in minute and invisible atoms. Some of the larger pieces that become detached from the stars reach the earth without being entirely consumed. We call them meteors, but the little particles that premeate the air, because of this perpetual and violent bombardment from the stars, are composed of phosphoric acid, potash and other chemicals, which are absolutely essential in renewing the fertility of the soil.

"What we call terrestrial dust is also of great importance to agriculture. In many places the soil is almost entirely composed of particles that have been left there by the winds. This is particularly true of soils that are made up of volcanic ashes, which are carried immense distances from the craters. A considerable percentage of the soil on the earth's surface was originally volcanic dust, which has been distributed by that good friend of man we call the wind. Pompeii and Herculaneum illustrate the great depth to which volcanic dust may reach. These are called *Æolian* soils.

"The clouds are water dust. Fog is a mixture of water, coal, terrestrial and meteoric dust. The fogs of London might be considerably reduced if the people would burn hard coal.

"The dust from the streets of cities is of a composite nature and carries all sorts of fragments and atoms in various stages of decay. It has a high degree of agricultural significance, because it is loaded with germs of all kinds. Some of them are very useful and some are injurious. The effect upon the public health is not injurious except where the dust carries pathogenic germs—that is, the germs of disease. As an illustration, the sputa of a

consumptive, if ejected on the sidewalk, is reduced to dust when it dries and is then distributed through the air in the form of germs. If they find lodgment in the lungs of a human being whose physical condition allows them to revive and grow, the disease gets a foothold and can be conveyed from one to another."

There has been more big money made by the farming interest of the country the past twenty years in either taking water to

lands where most needed through irrigation or removing it therefrom by canals, ditches, tiling or levees than in any other one enterprise.

Every farmer in the middle west, the south, the north west, the south west and west should subscribe for the Chicago Irrigation Age and follow its good advise. If they will do so, in the near future they will be money loaners instead of borrowers.



PULSE OF THE IRRIGATION INDUSTRY.

MONTANA'S ADVANTAGES.

In response to a letter of inquiry from Edward L. Flemming, of Philadelphia, as to the agricultural advantages of Montana, Donald Bradford, arid land commissioner, writes as follows:

"There are numerous 'benches' of various areas lying among the Clark's Fork, in Carbon county, possessing rich soil and contiguous to ample water supply for irrigation. The climate is such that four crops of alfalfa may be raised in a season and fruit and vegetables grow luxuriantly.

"The state arid land grant commission believes that the Clark's Fork valley is second to none anywhere in every element necessary to support a prosperous community, or number of communities, and it is ready, as soon as a sufficient number of men have been secured, to proceed to build canals or ditches to reclaim the land.

"The plan is to give employment to the settlers themselves in the construction of ditches and to pay in 'trustee's certificates,' which will be received in payment for water rights and will be accepted by merchants for supplies. These certificates will be secured by an equal amount of the bonds issued by this commission on behalf of that particular district, which, when fully paid, will be cancelled. In this way the indebtedness of any district may soon be cancelled.

"I may say that when any individual water right is paid for, the lien against it, under the law, is cancelled, so that it will not subsequently be liable for the debt of the district. The commission will sell water rights at cost which shall include actual construction, engineering,

interest on bonds at six per cent. per annum and the district's proportionate share of the expenses of this commission, which will be slight. After construction the state will own and operate the ditch delivering to each his share of water at the cost of operating and maintaining the ditch, which will be small.

"The land is a part of the Crow Indian reservation recently thrown open to settlement and can only be had by settlers themselves under the homestead act, and by paying \$1.50 per acre, one-half at the expiration of one year and the balance at the end of two years. I wish you could secure fifteen or twenty families in your region or elsewhere and communicate with me as soon as practicable."

FROM EDDY, NEW MEXICO

The Pecos valley has now made sufficient progress as an irrigation centre to entitle it to occasional mention in the AGE. Of the 1,400 square miles of cultivatable land in the valley 350 square miles are now under ditch and each year sees this area increased.

There are now over 125 miles of main canals from which branch 273 miles of laterals and 900 miles of farm supply ditches. In the aggregate there are five large dams, two immense artificial lakes covering 9,100 acres and 1,294 miles of canals and ditches capable of irrigating 300,000 acres.

The growing industry in the valley just now is the cultivation of the sugar beet of which it is estimated that 1,600 tons will be disposed of to the beet sugar factory this season. Farmers receive for this product \$4.25 per ton at a cost for production of about \$20.00 an acre,

twelve tons to the acre being the usual yield.

Next to the sugar beet, or possibly of equal importance comes alfalfa. With judicious irrigation an alfalfa field will bear six cuttings a year, yielding a ton to the acre at each cutting. A peculiarity about alfalfa grown in the soil of the Pecos valley is that it appears to enrich rather than impoverish it.

The irrigation system of the valley is constantly being extended by the company and new land brought under cultivation. Taking the past as a criterion it is safe to say that within another three years the number of acres now irrigated will be more than doubled.

GEO. H. HUTCHINS.

RECLAIMING THE LAND.

The following extracts are taken from the article on the reclaiming of arid lands, by Wm. E. Curtis, which appeared recently in the *Chicago Record*:

"Senator Wilson intends to spend his summer vacation in making a personal investigation of the irrigation problem in the west. Both the interior and the agricultural departments are now at work in that direction. The former, through the division of hydrography of the geological survey, is making a detailed examination of the fluvial system west of the Missouri river, for the purpose of ascertaining all the facts that can be learned in regard to the quantity and the value of the rainfall, the water from the melting snows, the courses and habits of the streams, the area of arid lands which may be irrigated by them, the best methods of distribution, and is making a hydrographic map of the arid region for the use of the government when it attempts to utilize the waters for agriculture.

The agricultural department, through Elwood W. Mead, an eminent irrigation engineer of Wyoming, who has his headquarters at Denver, has attacked the problem from another standpoint. He is

making experiments to ascertain the amount of water necessary for the cultivation of different crops in various sections of the arid region, is analyzing the soils and testing the various grains, grasses, vegetables and fruits which thrive best under irrigation. At the same time, in the irrigated states, he is teaching the farmers how to use water to secure the best results, and communicating the results of his experiments and investigations through the regularly published bulletins of the agricultural department. In other words, he is treating the problem from the practical side, while the geological survey people are treating it from the technical side. He works as a farmer, they as engineers.

Secretary Wilson is going out especially to satisfy himself as to the practicability of the reservoir system. There are said to be 600,000,000 acres of land in the western country, now useless because of the absence of water, which may be made productive by irrigation, and provision was sought in the last river and harbor bill for the construction of three experimental reservoirs along Piney Creek, Wyoming, for the purpose of demonstrating the feasibility of storing the spring floods for use in dry season. Scientists who have studied the subject maintain that there is plenty of water in the arid regions, but it runs away before it is needed, and the proposition is to contrive some means by which the melting snows and the heavy rainfall in the spring months may be detained until the dry season and distributed where it will do the most good. It has been proposed to construct the three reservoirs named as an experiment for a practical study of the question, but notwithstanding the efforts of Senator Warren, Senator Carter and other representatives of the arid states, the item was knocked out of the appropriation bill on the last night of the session. The subject is likely to come up again, however, in the next congress, and Secretary Wilson wants to educate him-

self by personal investigation, so that he may discuss it intelligently.

Several nice questions are involved in the irrigation problem. Some people contend that its solution should be left to private enterprise or to the authorities of the individual states; but when a stream of water flows through more than one state the general government must control it. It is also contended that Uncle Sam has no right to go into Wyoming or Utah and build reservoirs for the benefit of the people of those states with money from the public treasury. The answer to this is that if it is right for the government to build dikes and dams and jetties to protect the people of the Mississippi valley from floods, it is equally right to build dams and furnish water to the arid regions of the west.

It is estimated that the annual loss by the overflow of the Missouri river alone would build all over the northwest reservoirs which would regulate the flow of the spring rainfall and snow-melt, so as to prevent such destruction. According to the theory of the engineers, the reservoir system, if introduced into the upper Missouri valley, will obviate any future danger from floods along the Mississippi. The spring rise of the Missouri is just as certain as the annual rise of the Nile, and the army engineers have data by which they determine that a reservoir seven miles long, eight miles wide and thirty-one feet deep would keep the river at Sioux City below danger point.

Capt. Chittenden of the engineer corps has prepared plans for a reservoir forty-seven miles square and thirty-one feet deep, which he claims will control the greatest flood that has ever been known on the Missouri river, and it is argued that if money can be properly voted to protect the towns and plantations along the Missouri and Mississippi rivers from danger that always threatens them, and to relieve the people who are distressed thereby, it is equally proper to vote money to make that danger impossible.

It is also argued that if it is constitutional to dig out rivers and harbors in aid of commerce, it is equally constitutional to build reservoirs for the benefit of agriculture. Senator Warren asserts that the amount of money that has been expended upon the Fox and Wisconsin rivers in the course of the last twenty years would be sufficient to build reservoir systems at the headwaters of the Mississippi and Missouri rivers which would not only distribute water enough to cultivate 100,000-000 acres of land, but would permanently prevent the overflow of those rivers and add more to national commerce and prosperity in one year than will result in all eternity from the Fox and Wisconsin improvements. He declares, also, that if one-tenth of the money that has been spent in protecting the plantations along the lower Mississippi had been expended in reservoirs nearer the source of that river, there would be no more damage or danger to overflowed lands."

May 8th the Secy. of War issued an official permit granting the right, so far as his department is empowered to act in the matter to turn the waters of Lake Michigan into the drainage canal.

This official action of the Secy. of War must be approved by the Congress before the water can be so turned. This will doubtless be done early after the Assembly of Congress and by January 1900 we will see the waters of Lake Michigan flowing unobstructed into the Gulf of Mexico.

"Whereas, By section 10 of an act of congress approved March 3, 1899, entitled 'An act making appropriations for the construction, repair and preservation of certain public works on rivers and harbors and for other purposes,' it is provided that it shall not be lawful to alter or modify the course, location, condition or capacity of the channel of any navigable water of the United States, unless the work has been recommended by the chief of engineers and authorized by the secretary of war prior to the beginning of same. and,

Whereas, The sanitary district of Chicago, a municipal corporation organized under the laws of the state of Illinois, has constructed an artificial channel from Robey street, Chicago, to Lockport, and has heretofore been granted permission by the secretary of war to make certain improvements in the Chicago river for the purpose of correcting and regulating the cross section of the river so as to secure a flowage capacity of 300,000 cubic feet per minute, with a velocity of one and one-quarter miles an hour, it being intended to connect the same artificial channel with the west fork of the south branch of the Chicago river at Robey street in the said city of Chicago; and,

Whereas, The said sanitary district of Chicago has now applied to the secretary of war for permission to divert the waters of the said Chicago river and cause them to flow into said artificial channel at Robey street as aforesaid; and,

Whereas, The aforesaid district of Chicago represents that such movable dams and sluice gates as are necessary to, at all times, secure absolute and complete control of the volume and velocity of flow through the Chicago river have been constructed;

Now, therefore, the chief of enigneers having consented thereto, this is to certify that the secretary of war hereby gives permission to said sanitary district of Chi-

cago to open the channel constructed and cause the waters of Chicago river to flow into the same, subject to the following conditions:

1. That it be distinctly understood that it is the intention of the secretary of war to submit the questions connected with the work of the sanitary district of Chicago to congress for consideration and final action, and that this permit shall be subject to such action as may be taken by congress.

2. That if at any time it becomes apparent that the current created by such drainage works in the south and main branches of Chicago river be unreasonably obstructive to navigation or injurious to property, the secretary of war reserves the right to close such discharge through said channel or to modify it to such extent as may be demanded by navigation and property interests along said Chicago river and its south branch.

3. That the sanitary district of Chicago must assume all responsibility for damages to property and navigation interests by reason of the introduction of a current in Chicago river.

Witness my hand this 8th day of May, 1899.

R. A. ALGER,
Secretary of War.

JOHN M. WILSON,
Brigadier-General, Chief of Engineers, U. S. A."

WITH OUR EXCHANGES.

THE LA HOME JOURNAL.

The May issue of this publication is, in our opinion, much the best that has appeared in a long time. This is saying a great deal, as it is always an attractive journal. One of the most interesting articles is that of Joseph E. Chamberlain, "Helen Keller as She Really is." Few there are who have not heard of Helen Keller, and her wonderful progress in an educational way in spite of her having but three senses instead of five. To be deaf and dumb is a calamity; to be blind is still worse. But to be deaf, dumb and blind would be almost sufficient to cause one to "curse God and die." From her infancy, when she lost her sight and hearing, as a result of sickness, Helen Keller has been an object of compassion to all who have read of her, but the wonderful way in which she has made the best of things and made the most of life, is a lesson which pessimistic people should take to heart. Being blind as well as deaf, it has been a source of wonderment how she ever learned to read or to understand anything. This article explains the methods employed to teach her. The anecdotes concerning Geo. Washington are also interesting, while Anthony Hope's story, "The Countess Emilia;" "A Girl's Life on the Prairie" and the many other good things make the May number a banner issue.

THE NORTHWEST MAGAZINE.

That old reliable publication, *The Northwest Magazine* of St. Paul, Minn., is offering \$100 in gold for the five largest lists of new subscribers between this time and July 15. The prizes range from \$30 to \$25, \$20, \$15 and \$10, and the rules governing the contest are such that even those who do not win one of the prizes will still be well paid for his or for her work.

The Northwest Magazine is firmly established throughout this country, where it has thousands of friends, and the above

offer affords an excellent opportunity for clerks, school teachers, housewives, and all money-making men, women and young folks everywhere to earn a handsome sum of money quickly and easily. For full particulars, write at once to *The Northwest Magazine*, St. Paul, Minn.

Robert Barr, in the first of a series of papers on his Travels and Troubles in the Orient, tells some stirring stories of American "guns that can speak Turkish."

"Life would not be so very well worth living along these shores if it were not for the American cruisers, * * * * which do many things that fail to appear in the official dispatches." Just how United States Naval officers sometimes deal with troublesome Turks, Mr. Barr tells in *The Saturday Evening Post* of May 13.

THE FORUM.

A leading characteristic of *The Forum* during the thirteen years of existence has been its impartial discussion of the questions of the day. The May number admirably illustrates this feature by the presentation of two articles on the Trust problem. Aldace F. Walker, formerly an Interstate Commerce Commissioner, and now chairman of the Atchison, Topeka & Santa Fe Railway Company, writes on "Anti-Trust Legislation"; and Wilhelm Berdrow, the eminent German economist, discourses the "Trusts in Europe." The temperate tone of these papers is excellent; and they form a valuable contribution to the discussion of this burning question.

"The Irish Leaven in American Progress" is the title of another paper which supplies a pretty strong case for the part which the Irish have taken in the upbuilding of the Republic. The author, Mr. Jno. J. O'Shea, editor of the *Philadelphia Catholic Standard and Times*, is himself an Irishman, and he brings to his task a forcefulness begotten of full belief in the justice of his cause. His paper cannot fail to be of interest to all readers of Irish decent

in the United States; but it is also interesting reading for Americans generally.

SCRIBNER'S

Scribner's Magazine for May has secured from Major-General Leonarn Wood, the military governor of Santiago, the first official account of the great work which has been accomplished in that province. It is practically the making of a State by a military director, all of whose purposes are benevolent, and who has no legislature or other authority to consult—deriving his power directly from the President of the United States. General Wood's narrative, which is the only thing that he has written, is marked by a forcible directness and modesty in telling of the things accomplished. The way in which the city was cleaned, the indigent relieved, the streets repaved, schools established, and all of the machinery of a civilized government, instituted, is a remarkable record of achievement in military government. The illustrations contrast the old Santiago with the new, and show the work of regeneration.

A striking account of colonial government is also given in the picturesque paper by G. W. Steevens on "The installation of Lord Curzon as a Viceroy of India," which reveals what long years of British rule have made out of a subject people. Mr. Steevens is the famous war correspondent (the author of "With Kitchener to Khartum") and this is his first article in an American magazine. It is a brilliant piece of descriptive writing, giving pleasing glimpses of the personality of the new Viceroy and Vicereine who was an American girl.

"Aunt Minervy Ann" tells another story, "How She Went Into Business," in the inimitable manner of Joel Chandler Harris, with Frost's illustrations.

THE REVIEW OF REVIEWS.

In view of the peace conference soon to take place, the article on "Our Delegates to the Peace Conference," is particularly appropriate for the May number. A short sketch, together with a portrait, is given of each of the men who are to represent this country. Andrew D. White, Stanford Newel, Seth Low, Alfred T. Mahan, Capt. Wm. Crozier and Fred W. Holls, comprise our delegates. "The Quarrel Between

Norway and Sweden," "International Law in the war With Spain," and "Conventions and Other Gatherings of 1899" are other timely topics. The cartoons are almost crowded out, but room was found for a page or two of particularly good ones. The editorial department includes portraits of men who are prominently before the American public, among them being those of Thomas B. Reed, M. Quay, Hon. H. S. Pingree, Mr. Croker, and many others.

MCCLURE'S.

McClure's Magazine for May will introduce a new writer, Mr. Booth Tarkington, of Indianapolis, with the opening installment of a novel of present-day American life. The story is pronounced by those who have read it in manuscript as fresh and absorbing in plot and remarkably pleasing in its atmosphere and spirit. Rudyard Kipling will have a story entitled "The Flag of Their Country," which exhibits very dramatically the difference between a popular orator and a sensitive, high-minded boy in their respective ways of "honoring their flag."

J. L. Steffens, city editor of the *New York Commercial Advertiser* will tell the story of Theodore Roosevelt's experience and dealings with party leaders and political reformers from the moment he began to be named for Governor of New York down to the present time. It is no ordinary story, and it has never before been told in full.

Oscar King Davis, the correspondent of the *New York Sun* at Manila, will relate some stories and reminiscences of Admiral Dewey as Mr. Davis himself has seen and known him during months of service beside him at Manila.

Miss Tarbell will write of "Lincoln's Search for a Man," relating from contemporary letters and reminiscences, mainly unpublished, the story of Lincoln's personal relations with the successive commanders of the army from McClellan down to Grant. The paper will be fully illustrated.

The May *McClure's* will contain another series of C. D. Gibsons' Egyptian sketches and more of Hamlin Garland's gold-trail poems. It will also contain another of John A. Hill's striking railroad stories.

ODDS AND ENDS.

PREACHER PRACTICED A BIBLE MAXIM.

A friend of the Rev. Dr. P. S. Henson, the popular Chicago preacher, not long ago found the pastor in one of the large department stores of the Western city. He was leaning up against a supporting pillar in a brown study.

"Why, Henson, what in the world are you standing there for?" asked the friend.

"Oh," said the witty parson, as a twinkle came into his eye, "just putting into practice that verse in the Bible: 'All the days of my appointed time will I wait till my change comes.'" — *March Ladies' Home Journal*.

STOPPED RAILWAY EXTENSION.

The Commissioner of Indian Affairs through the agent of the Nez Perce reservation has stopped the Northern Pacific railroad from extending its line from Lewiston to Grangeville, Ida., across the Nez Perce reservation and has also forbidden its extension over the Indian allotted lands.

The railroad company has appealed to the Idaho delegation to secure withdrawal of the prohibition, giving assurance that if allowed to extend their lines to the point desired, they will willingly agree to whatever requirements the interior department think proper to protect the Indians' rights.

Senator Heitfelt will see the Commissioner of Indian Affairs and Secretary of the Interior, and will endeavor to ascertain what arrangements can be made which while fully protecting the rights of the Indians will also give to the settlers the benefits of the railroads.

Camas prairie is from forty to sixty

miles from the road, and Grangeville is the center of a section which is one of the most fertile in Northern Idaho.

"A slap in time, saves nine," said the prudent mother as she slapped the baby's hands.

The Irrigation Age will have an extended article on the drainage canal in the near future giving a full description of the mensivity of the work, by whom built, the machinery used in construction, and cost of the enterprise, including a careful estimate of the possible lowering of the waters of Lake Michigan by turning its waters into the drainage canal.

The visit of Secy. Alger to Chicago and inspection by him of the drainage canal was timely, and shows the Secy. of War to have an eye open to the best interests of the country in civil as well as military matters.

We had an opportunity to see a shipment of trees and shrubs from Hill's Nursery of Dundee, Ill., and were astonished at the pains taken in wrapping and packing. When the packages were opened and the trees taken out they looked as fresh as though they had just been taken out of the ground.

WINDMILLS.

The first barley-mill was introduced into Scotland from Holland by an ingenious mechanic named Andrew Meikle. But it was many years before the invention came into general use, owing chiefly to the superstitious prejudice of the country folk, who looked upon the grain thus cleaned

with suspicion, as procured by "artificially created wind." The clergy even argued that "winds were raised by God alone, and that it was irreligious in man to attempt to raise the wind by his own efforts." Scott is evidently expressing the popular sentiment when, in "Old Mortality," he makes one of his characters chide those who would raise wind "by human art, instead of soliciting it by prayer, or waiting patiently for whatever dispensation of wind Providence was pleased to send upon the shealing-hill."

Stories are still told, in the neighborhood where Meikle lived, of the labor-saving contrivances he adopted in his own household. One day a woman came to the mill to get some barley ground, and was asked to sit down in the cottage, hard by till it was ready. With the first sound of the mill wheels, the cradle and the churn at her side began to rock and to churn, as if influenced by some supernatural agency. No one but herself was in the house, and she rushed from it, frightened almost out of her wits.

Such incidents brought an ill-name on Meikle, and the neighbors declared of him that he was "no canny."

He was often summoned to great distances, for the purpose of repairing pumps or setting mills to rights. On one occasion when he undertook to supply a gentleman's house with water, so many country mechanics had tried it before and failed that the butler would not believe Meikle when he told him to get everything

ready, as the water would be sent in the next day.

"It will be time enough to get ready," said the incredulous butler, "when we see the water."

Meikle pocketed the affront, but set his machinery to work early the next morning; and so well did the engineer fulfill his promise that when the butler got out of bed he found himself up to his knees in water.

Meikle reaped no financial reward from his inventions; his name is scarcely mentioned in Scotch biography; yet the statement on the monument erected to his memory is literally true: "He rendered to the agriculturists of Britain and of other nations a more beneficial service than any hitherto recorded in the annals of ancient or modern science."—Youth's Companion.

A Georgia Granger who quit raising 4-cent cotton and has gone to real farming says he now has

Corn in the crib,
 Chicken in the yard,
 Meat in the smoke house
 And a tub full of lard.
 Milk in the dairy,
 Butter by the load,
 Coffee in the tin box
 And sugar in the gourd.
 Cream in the pitcher,
 Honey in the mug,
 Cider in the "Jimmy John"
 And lickier in the jug.



IMPORTED DATE, "AMREYAH," IN BEARING AT PHOENIX, ARIZ.

THE IRRIGATION AGE.

VOL. XIII.

CHICAGO, JUNE, 1899.

NO. 9.

THE PROGRESS OF WESTERN AMERICA.

**Give Us
Your "Ad."**

We are constantly receiving letters from various parties asking for information as to irrigating machinery, where it is manufactured, the best systems to use, etc., etc. We would like, therefore, to carry the advertisements of dealers in everything of this character, so that inquiries may be promptly answered by sending a marked copy of the AGE, thus saving us the time and postage otherwise required in answering each letter personally. The fact that we receive such queries is proof positive of the value of the journal as an advertising medium. We want every dealer to send us his catalogue and price list for us to refer to, and we also want his ad. Rates will be gladly furnished upon application, and sample copies sent. We also want everyone who has land to sell to communicate with us.

**Montana
Takes
the Lead.**

What is to be done with our arid lands—how they can best be reclaimed and made homes for the poor of the crowded cities—is one of the many perplexing questions which call for answer from those who have the welfare of the masses at heart. There is many a man in the city, struggling to keep the wolf from the door, who would gladly embrace an opportunity to become independent on a small tract of land, but alas, his means are so scanty as not to admit of his buying land, no matter how low the price, since he would not have enough left to provide for his immediate needs until the first crop were harvested. The opening up for settlement of Clark's

Fork Valley by the state of Montana, bids fair to be a partial solution at least of the puzzle. This is the first instance in this country in which a state has undertaken to put settlers upon the land and give employment with which to support themselves during the first year, and it would seem a worthy example for other states to follow.

Colonies or associations, usually banded together by some religious ties, have been formed and have been in most cases successful. An instance of this is the Salvation Army colony at Holly, Colo., founded by Booth-Tucker. If such colonies can succeed why not those founded along a little different line. Donald Bradford, vice-president and general manager of this state arid land grant commission, writes us that the method employed by the state of Montana is really in the nature of a loan at seven per cent. interest, to be paid back at cost, giving them five years in which to pay it in annual installments." He further says, "Were the states to lend their credit, through the agency of a state commission like our own, I am satisfied that the people of the state would not have to bear one per cent. of the burden, and that on the other hand the incoming settlers and the increased wealth would meet every engagement made by the state in their behalf."

In another portion of this issue we give a more complete account of this project, which we think should be agitated in every state.

Something to Read.

We wish to call attention this month to our great offer to new subscribers who pay in advance or to old ones who pay up arrears and for a year in advance. On another page we give a list of books which are given as premiums and also our clubbing list. This is a wonderful chance to obtain standard works free and get a good magazine into the bargain. Do not fail to see our list. Subscribe now. If you have friends who you think would like a sample copy of the AGE, send us a postal giving their names and addresses and we will be glad to send them sample copies.

Received With Thanks.

We are in receipt of the 1896-7 report of the United States Geological Survey, under the direction of Chas. D. Wolcott. These books give the geological researches and work in this country and are interesting as well as being valuable for reference. The plates illustrating the text are especially fine.

Meeting at Wichita.

Saturday, June 3, saw the closing of the meeting of the Trans-Mississippi Congress at Wichita, Kansas. After a hard fight between the National Irrigation Congress and the Trans-Mississippi Congress, a compromise was made by inserting the cession of arid land clause in the resolutions. The resolution passed was not, as has been claimed, an altogether unqualified endorsement of the storage reservoir plan, owing to the many restrictions imposed. On the closing day of the meeting there were many additional resolutions passed as follows:

For the government construction and ownership of a Nicaraguan canal; opening of southwest pass, Mississippi Delta; hastening of deep water work at Houston, Tex.; fostering beet sugar industry by Congress; re-enactment of the original homestead act, prohibiting coolie or other contract labor; recognizing the prowess of the army and navy in the war with Spain.

The National Irrigation association, organized with Joseph M. Carey of Wyoming, author of the Carey act, as President, George H. Maxwell of California, chairman of the Executive committee, and Henry Michælsen of Colorado as secretary, in order to secure increased

membership and funds with which to urge its claims.

We are fortunate in being able to present in another part of this number, one of the papers read at the meeting—that of F. H. Newell, Hydrographer of U. S. Geological Survey.

Decided at Last.

The celebrated International Dam case, which has occasioned so much controversy and been before the public for so long, came to a final decision the latter part of May, 1899, the judge of the Supreme Court at Washington has sustained the injunction gotten out to prevent the building of a dam above El Paso, Texas. The case has been remanded to the Lower Court with instructions that an official investigation be made as to the points covered by the injunction. We have an article by Mr. I. A. Barnes, of El Paso, giving full particulars as to the decision, which we will give in our July number, it being too late to have the illustrations made for this issue.

Romance and Reality.

How much of romance there is in the lives of the most common place people and how much personal appearance has to do with our judgment of a case. It is quite natural to imagine a romantic episode in the history of the tall, slight creature who gazes at you with a soulful look in her big childish eyes, and when you see her in a dainty hat and crisp shirt waist you are quite ready to believe that some man's life was spoiled by her refusal, or you may fancy you can trace "disappointed hopes" in the pathetic droop to her mouth. In reality that pathetic droop may be merely ill temper caused by her dress maker having disappointed her, and though she looks so slight and fragile, it would be wise to charge a good round sum for her board.

You cannot connect romance with the stout middle aged woman who is vainly trying to induce the grocer to let her have a peck of apples for thirty-five instead of forty cents, and yet perhaps it is for love of some man she thus bargains. It is hard for you to believe that she once attempted suicide because she thought her worthless husband cared no more for her. Yet such is the fact. We still cling to childish

traditions: the princess must be young and beautiful and the wicked fairy wrinkled and hideous. The best of us will judge by appearances. "Cl.thes do not make the man"—no, but they help to make the woman, in a man's estimation. A man rails at woman's folly in the line of dress: he ridicules her high heeled, narrow shoes, her small waist, her long dress. But when he marries does he choose the sensible girl who is dressed in accordance with his views, whose skirts are just short enough to display her broad, common sense shoe, whose waist is unconfin'd by lacing, who disdains the charms of "frizzes"?

Indeed he does not. His wife will be a doll-like creature whose feet are crowded into shoes three sizes too small, who wears a trail, a bustle and "rats" in her hair. And he is as proud of her 21 inch waist and her number 3 shoe as she can possibly be.

Despite the joking and "joshing" concerning the curfew law, its friends are working industriously to see that the law is not only passed, but enforced after it is passed, and we hear every now and then of a city or town added to the list of those that have adopted it. Spokane, Wash., has had a curfew law but it has been more honored in the breach than in the observance, until recently, when Mayor Olmsted decided after a thorough investigation that the law is a worthy one and deserving of being enforced. So henceforth the little lads and lassies under 14 years, must keep off the street after 8 o'clock at night in winter and 9 in summer. An effort was made to make the age limit 16 years instead of 14, the fine is \$5 or imprisonment in the city jail until paid.

While at first glance a law of this kind strikes one as unjust and difficult to enforce, a more thorough investigation of it will reveal its merits. In small country towns it is not so necessary to have the curfew, as "early to bed and early to rise" is the motto of the majority of the inhabitants, young and old.

But in the city it is different. Parents among the lower classes have so little control over their children that it is quite

useless for them to forbid the young people going out on the street or in fact anywhere else they choose, and in a great many cases the parents do not try to keep the children at home, as they are free from the responsibility of looking after them if they do not know where they are. Ask many a Mother at 9, 10 or 11 P. M. where her little girl of 12 or 13 years is and she will say carelessly, "Oh, I don't know, can't tell where she is. Most likely out on the street playing." "On the street" is as indefinite as a man's "Down town" is to his wife, which is saying a very great deal, the latter may include most any place.

So for the child whose parent can not or will not keep her children at home evenings the curfew bell may carry more weight, as there will be before their childish eyes a vision of themselves in "durance vile," if caught on the street later than the lawful limit.

Years ago—and not so many of them either—mothers marched their young hopefuls off to bed at 8:30 sharp, and no curfew was necessary. It may seem hard on the kids, but like most disagreeable things it is for their good. Perhaps the little girl who asked "why good things were always so nasty and bad ones so nice" was a victim of the curfew ordinance.

We recently saw, in the *Journalist*, of New York city, a short biographical sketch of Lodian Lodian, with portrait. We hope later to be able to present in our pages the portrait of this wonderful man, whose life is so full of adventure and incident.

One often wonders, when passing a farm house, that stands exposed to the winter winds and summer heat with never a tree near to cast its protecting shade in summer and break the force of winter's icy blasts, why it is that the dwellers therein do not plant a few trees of some description. In the western states where water is scarce and economy has to be used regarding it, we can understand, to some extent, why anything that tends to take up moisture from the soil unless a money-producing growth, would be dispensed with. Still even there

**The
Curfew
Law**

**Lodian
Lodian.**

Trees.

is no excuse, much less for the eastern dwellers.

Our fore-fathers, one generation back, seemed to be possessed with a mania for cutting down trees—any and all kinds—but their descendants should have advanced far enough to realize the manifold advantages of the forests and instead of destroying, create; or in other words, plant trees.

On every farm, there is always some spot, a neglected fence corner or an unused spot near house and barn, where a fruit tree might be planted and in a few short years, furnish both fruit and shade. It is said that Germany has a quaint custom. The heir to the ducal throne, on his eighth birthday plants a linden tree in the historic grove of "royal lindens," where his fathers and grandfathers before him have observed the custom by planting a tree on their eighth birthdays.

If the farmer would commemorate an event of unusual interest by planting a

tree, he would in his old age have a living, growing diary, each tree marking some event in his life, and serving as a bit of sentiment in his prosaic life, as well as being useful—that maple by the front porch was planted on the day his first boy was one year old; (woe betide him if he plants any such "age-revealer" on his daughter's birthday), and that mighty apple tree by the well was planted the year he and "Ma" were married. It doesn't bear much now, but it is such an old land mark it still stands.

The pine by the gate "Ma" planted on the fifth anniversary of their marriage. And that tender shoot over yonder is from the acorn that his little grandson planted last summer to "make a garden." No wonder that the poet cried.

"Oh woodman spare that tree."

What we want now is a poet to sing to the farmer

"Oh farmer plant that tree."



THE DESERTS OF THE OLD WORLD AND THE NEW.

THE DATE PALM IN THE UNITED STATES.

BY J. W. TOUMNEY, B. S., Tucson, Ariz.

In the Old World, portions of the great desert belt which extends from India on the East to the Atlantic shores of Morocco on the West, have been under cultivation wherever water has been available for purposes of irrigation, from remote times.

In the New World, a region comprising Northern Mexico and Southwestern United States, lies in the same general latitude and belongs to the same desert belt. Moreover, the meteorological conditions prevailing in these two regions are strikingly similar.

The arid regions of the Old World have long been under cultivation, but it is only in recent years that the arid regions of Southwestern United States have seriously claimed the attention of the tiller of the soil. It has, however, been amply demonstrated that wherever water can be obtained in sufficient quantity the soil is very productive.

In the Old World deserts, the plants grown are either those that are indigenous to the desert and which have developed into valuable economic plants through many years of cultivation and selection, or they are plants originally indigenous to semi-arid or in a few instances to humid regions, which have developed valuable varieties, capable of withstanding the changed environment, through many years of continuous residence on desert soil. On the other hand, arid America has few indigenous plants that have as yet developed economic forms of much value under cultivation, neither have plants from more humid localities had time to become thoroughly acclimated in the comparatively few years that this region has been under cultivation.

In the desert regions of America the agriculturist is so remote from similar regions in Africa and Asia that he has not drawn upon them to any extent for the seeds and plants that he has attempted to grow. In most instances he has brought them from his old home in New England or the Middle West and planted them upon desert soil, thinking that he but needs to open the gates at the heads of his canals and laterals and direct the water over his fields, in order to insure a profitable harvest.

He has overlooked the fact that irrigation will not overcome the excessive heat and dryness of the atmosphere. He has overlooked



DATE, SEVEN YEARS FROM SEED, IN BEARING AT TUCSON, ARIZONA.

the fact that plants indigenous to humid regions are in most instances ill suited to grow in our most arid regions, no matter how much water be supplied in irrigation.

It is imperative that dwellers in arid America give more attention to the source of the seeds and plants which they undertake to grow. With grains and vegetables, i. e. plants which require but a few years from seed to maturity the question of the environment under which the seeds planted were grown, is not so important as it is for plants that survive for a greater period than a single season. With plants quick to mature, the question of humidity and temperature can be largely modified by season of planting. Perennials, on the other hand, must continue in growth during a considerable portion of the year. They must be able to withstand an exceedingly hot and dry atmosphere during the summer and from five to fifteen degrees of frost during the winter. They must be able to stand a daily range in temperature varying from thirty to fifty degrees, not only without injury to the plants but without harm to the fruit which they must bear in order to be of value.

The natural environment of the date-palm makes it well suited to the more arid portions of Southwestern America. It is the most characteristic and wide-spread economic tree of the Old World deserts. It is indigenous to the desert and is not injured by extreme heat and aridity and a moderate degree of cold, neither is it affected by wide variations in the daily range in temperature.

Although the date has rarely prospered as an economic tree when taken from its home and grown in similar latitudes, the explanation lies in the fact that it has usually been taken from its desert environment and planted in humid regions. Centuries of experience has demonstrated that the countries where the date does best are characterized by intense summer heat and an almost total absence of rain. However, its roots must be well watered.

In the date regions of Northern Africa and Southwestern Asia the mean annual precipitation varies in different localities from fifteen inches to less than one inch. In Southern Arizona the average annual precipitation for a period of eighteen years is as follows: Phoenix, 7.08; Tucson, 11.63; Yuma, 3.05.

The average precipitation for the year practically coincides in the two countries and the excessive dryness of the atmosphere in Northern Africa finds almost its parallel in Southern Arizona. So also the temperature of the date regions of Northern Africa is very similar to that of Southern Arizona. The following are a few of the many comparisons that might be given. The mean maximum annual temperature of El Golea, Algeria, 88 degrees F.; Phoenix, Arizona, 88.1 degrees F.; Gardaiia, Algeria, 83 degrees F.; Yuma, Arizona, 85.9 degrees F.; Laghouat, Algeria, 78 degrees F.; Tucson, Arizona, 81.1 degrees F.



SPECIMENS OF FRUIT FROM SEEDLING DATES; BEFORE RIPENING, BUT OF MATURE SIZE.
GROWN IN SALT RIVER VALLEY.

The mean minimum annual temperature for the same places is as follows: El Golea, 56 degrees F.; Phoenix, 50 degrees F.; Gardaia, 56 degrees F.; Yuma, 58.3 degrees F.; Laghouat, 49 degrees F.; Tucson, 52.9 degrees F. The mean annual temperature at Cairo, Egypt is 71 degrees F.; at Yuma, Arizona 72.6 degrees F., at Phoenix, Arizona 69 degrees F.

Dates are successfully grown in regions where the winter temperature falls as low as 20 degrees F., and their growth is still possible where the temperature occasionally falls 14 to 16 degrees F. below freezing. They are grown in regions where the orange is unable to exist for a single winter.

On the tableland of Baluchistan, and a few other regions of the Old World, dates are profitably grown where the sum total of summer heat is far less than in favorable localities in Southern Arizona.

Experience has taught that the Northern limit of successful date culture, so far as dependent on temperature, is marked by the lowering of the average temperature for the year below 69 degrees F. This, however, is only an approximate guide, as it is not so much the warmth of the entire year or the absence of winter's cold that the date palm requires, as it is a high temperature for eight or nine months of the year, during which the tree makes its growth, blossoms and ripens its fruit. A high temperature for this period is important.

Aside from the value of the date as a desert plant its influence on the cultivation of other plants is considerable. Many economic plants unable to withstand the almost vertical rays of the sun, receive from the crown of the palm enough shade to enable them to be grown with success.

Putting away the above evidence, proof in regard to the successful production of dates, in Southern Arizona lies in the actual growing of them.

The date palm has been grown in portions of the United States and adjacent Mexico for many years. Within the borders of the United States, however, until recent years it has been planted in more or less humid regions where it matured little if any fruit, although in many instances the trees grew luxuriantly and to large size.

The date as a fruit producer being indigenous to a desert environment does not take kindly to humid regions. In the more arid portions of Lower California and Sonora the early plantings have been more or less successful and dates of fair quality have been grown for some years.

In the vicinity of Yuma date seeds planted in 1875 have grown to trees which are now from thirty to fifty feet in height and which have fruited without interruption for the past nineteen years. These trees produce yearly from six to nineteen bunches of fruit, the bunches weighing from fifteen to forty pounds.



A ROW OF DATE PALMS AND OLIVES, GLENDALE, ARIZ



AN EIGHT YEAR OLD SEEDLING DATE AT GLENDALE, ARIZ., BEARING AN ESTIMATED CROP OF FOUR HUNDRED POUNDS

In recent years many seedling dates have fruited in Salt River Valley, some of which have produced fruit of good quality and fair size.

With the exception of a few plants imported by the Government and distributed in 1890-91 to various places in New Mexico, Arizona, and California, the dates grown in this country are seedlings. It is not to be expected that all seedlings will produce desirable fruit.

On the other hand many will produce fruit totally unfit to eat, while only a small percentage will be of special merit. That seedlings have done so well argues much for the future of the date industry in Southern Arizona.

At most, the portions of the United States suitable for growing dates is confined to narrow limits. It is not likely that dates will be profitably grown outside of the irrigable regions of Southern Arizona and Southeastern California. The industry is in its infancy, approved varieties have not as yet been imported, and the quantity of fruit grown has not reached sufficient magnitude to give to it a commercial rating.

NO ROYAL ROAD.

There is no royal road to God!
 The humblest clod
 Who kneels him down and dares
 Send one or maybe many prayers
 Up to the heart that waits
 At mercy's open gates
 Treads it, aye, as the elect have trod!

There is no royal road to God!
 The chastening rod
 Of conscience has a sting.
 Alike for beggar and for king,
 And if each soul obey
 What, then, can lead them far astray,
 Though one be bare of foot and one most richly shod

There is no royal road to God!
 The common sod
 Are we, though on a throne
 Or born low down to grieve and moan.
 All our inheritance is this—
 A thoroughfare to eternal bliss
 That, if our eyes but see, is smooth and broad.

—Edward Wilbur Mason



A THIRTY POUND BUNCH OF DATES GROWING ON IMPORTED
PLANT, "AMREEYALE."

WATER STORAGE.

BY F. H. NEWELL, Hydrographer, U. S. Geological Survey.

Presented before Trans-Mississippi Commercial Congress, Wichita, Kan.

The most important problem that can come to any body of public men, commercial or otherwise, in the West, is that of the increased utilization and development of the vacant lands both in public and private ownership. Before this question most of the other matters sink into comparative insignificance, for without an increase in population and productive capacity the West cannot continue to furnish a market for the manufacture or a field of operation for the varied industries of the country. The utilization of the vast extent of vacant land is not something which should be left to the farmer; it is pre-eminently a matter for the business man, whether concerned in manufacturing, transportation, or in handling the products of others. In fact the farmer, as such, has least concern with the development of the resources of the vast West. As long as he has a market for his produce, it makes little difference to him whether the vacant lands of an adjacent county or state are populated. To the merchant, however, the matter is entirely different. Continued stagnation or retarded development must inevitably operate to reduce his chances of financial success.

The development of the agricultural resources of the western half of the United States has practically come to a standstill, or at least is going on only at the average rate of the whole United States. There are, of course, local exceptions, but in comparison with the conditions existing ten years it appears as though development had stagnated. The reason of this is not difficult to give. The greater part of the lands are arid or semi-arid and although among the richest in the world will not produce crops except by the application of water. Irrigation has been introduced and carried forward in favored localities all over the West and where the ditches have been built by the land-owners the profits or increased land values have been enormous. The opportunities for continuing developments in this line have nearly ceased because of the fact that these choice spots have been taken. There still remain great areas to which water can be brought from rivers of notable size; but before this can be done, large sums of money must be invested in the construction of expensive works. The experience of the last ten years has shown that these large irrigation works do not pay, and probably cannot, as a rule, be made to pay a fair interest on the investment.

While it has been demonstrated that irrigation investments on a large scale do not return a fair interest to the persons who furnish the money, yet, on the other hand, there is no doubt that taking the community as a whole the benefits are far beyond the first cost; but, unfortunately, these benefits do not redound to the advantage of the men who have furnished the capital and have taken all the risk and trouble of managing a large enterprise. These facts, although recognized for some years, have been so unpalatable to the promoters of the country that the men who have had the courage to state them have been continually assailed and the correctness of their statements called into account. The truth, however much we dislike to admit it, is so generally recognized that it is worse than useless to attempt to conceal the actual conditions. Many instances can be cited where meritorious projects now under consideration are awaiting definite action because it is impossible to show to the investors a single example of profitable investment of this character. Millions of dollars could be had for the construction of irrigation works, if it could be demonstrated to impartial and critical experts that similar investments were now returning a fair interest on the original capital employed.

We have the anomalous condition existing of great enterprise of state or national importance languishing for need of capital. At the same time it is admitted that these enterprises will benefit the community to a far greater extent than the first cost. On the other hand are millions of dollars awaiting an investment, but deterred from the fact that it cannot be shown that these enterprises will prove profitable to the investors, although unquestionably yielding returns far in excess of their cost. Putting these things together the question arises, what shall be done? And the answer must be that the community benefited, whether the state or nation, must in some way either furnish the capital for building these great works, or secure to the men who take the risk, a fair earning on their investment. How this is to be done is a matter of detail and cannot be worked out until general recognition can be had of the conditions just described.

The utilization of the vacant lands now comprising a third of the whole United States, and the consequent increase of population and of all industries, is to a large extent dependent upon securing more water. It is not possible, taking the year as a whole, to secure a greater amount than now exists, but it is possible to increase the available supply many fold by saving that portion which now goes to waste. In order to increase the available supply two methods are especially prominent. The first is that of storage of the floods or winter waters, and the second is by pumping water from underground, or from streams from which it cannot be taken by gravity. Pumping is essentially the problem for the Great Plain region, and to a less extent, for money parts of the West. It is particularly important in many

portions of California, where the conditions are such that water storage can not be had.

The great advantage, or one of the great advantages, of pumping water for irrigation is that the man who would develop a tract of land, or the farmer who cultivates it, is practically independent. Most of the successful pumping plants are and always will be small, and matters of individual concern. Pumping on a large scale, while it will undoubtedly be done in many localities, will, from the nature of the case, never be as important as the raising of water by small, cheap, or home-made devices. A small pumping plant can be installed by almost any farmer or mechanic, and with a little ingenuity and care can be made highly profitable. If not successful the first time, it is capable of indefinite modification and change. A mistake made at the outset does not ruin the whole enterprise, as in the case of water storage.

The power used for pumping water is as varied as the kinds of machine. In some localities horses or oxen are successfully employed and in others various forms of motors operated by gasoline or steam engines, by water-wheels or by other devices. The most common source of power, and by far the most important, is that from the wind. This is particularly the case on the great plains, where thousands, and possibly millions of windmills have been or are, about to be erected. The power is sufficient for all purposes and the kind of mill and pump matters little, although in the long run the best must be used. Every encouragement should be given to the increase of small pumping plants suited to local circumstances, for by the use of these farmers learn quickly how to produce the best results with the least amount of water, or of wasted energy. They thus become experienced and competent to take up irrigation farming on a larger scale.

The reasons for the financial failure of large irrigation works need not be discussed at this time, but it is important to know that one of the causes, if not the most important, has been the fact that a few farmers purchasing or occupying lands under these great systems have been competent, at first, to handle the water and to successfully raise crops. Many have failed or have become discouraged, and the great majority have not been able to make the payments agreed upon. Those who have succeeded have often done so by using the water in the most wasteful fashion, and have not only injured their own lands, but have often ruined adjacent tracts and have jeopardized the success of others by the lavish spreading of water over the surface. Using water from the pumping plant, it is not possible for a man to be as wasteful as when he obtains his supply from a gravity system, and thus the thousands of farmers who are dependent upon windmills or other forms of motors for raising water are becoming adepts in the art of producing the largest crop with the least waste. Whenever a large body of such experienced men can be induced to settle under a great irrigation canal one of the principal causes of failure will be removed.

The development of the vacant lands by pumping can be left largely to itself, as it is a matter of growth and of the spread of information. But the providing of great storage works is an entirely different question; it can come only through sustained effort and interest on the part of the public as a whole. Pumping water may suffice for the Great Plains and for some favored valleys, but for the arid west as a whole water conservation is the only source of relief. It is useless to hope that this will come through private enterprise. Reservoirs, mostly small, may be built here or there by corporations having large landed interests, or concerned with the increase of supplies for a city or suburban population, but they cannot be constructed for a development of great areas of improved, or partially improved farming land. These must either lie idle, or united action must be taken along definite lines established by careful investigation and expert report.

The importance of water storage has already been recognized by the Congress of the United States, but the efforts of Senator Warren, of Wyoming, and other western senators, have not been as strongly sustained as is necessary for ultimate success. They must be continually and strongly backed by the great commercial and transportation bodies of the country, as well as by the people at large. If the localities are wisely selected and the structures are economically built, there is no doubt but that storage works will return directly and indirectly their cost, and ultimately a reasonable percentage on the investment, especially if we take the increased values of all taxable property. The funds thus used, if appropriated by the state or nation will ultimately come back, and can be used over and over again. These funds cannot be made available until the united sentiment of the country demands forward movement along definite lines. It is waste of time to talk about private capital constructing these great works, and less than useless to argue that the capitalist ought to be willing to take the risk of building great storage works with the possibility of receiving his money back again, if unsuccessful, after the lapse of many years.

FARM RESERVOIRS.

T. S. VAN DYKE.

The following paper was read at the Pomological Society meeting in Riverside, Cal., on May 4.

“Many small reservoirs have been built in the last twelve years, and all that I have seen or heard of have been practical failures, where intended to give safe storage for water enough to irrigate any considerable area of fruit trees in full bearing. Small reservoirs differ from large ones only as small fish do from large ones. Both demand genuine water and decline to work on wind. Most of the mistakes have arisen from not considering the difference between a pond that you may fill several times in the growing season from summer rains, or flowing streams, artesian wells or some pumping system, and those that receive little or no water during the irrigating season, but must depend upon the winter floods. The latter will almost always be failures, unless built on a scale entirely too expensive for an ordinary ranch. Much money and time have been wasted on them, and many trees planted to be of no use. With the return of the usual rainfall and a series of good years this experiment will again be popular, and in time be almost certain failure, even in years of fair rainfall. As a rule, water can be reservoiried most cheaply on the largest scale. The small scale is both expensive and unreliable.

Consider first, that it takes an acre a little over fourteen feet deep to hold an inch of water—that is, for a year, or 365 twenty-four-hour inches. It takes a very good basin with a fairly flat floor to hold an average depth of water equal to one-third the height of the dam. Such basins as you are likely to find for farm use will not hold over one-fourth of the heights of the dam, and in many the average depth of the water back of the dam will not be over one-fifth, as where there are many sloping points jutting into it, with mounds or ridges in the bottom.

Taking the mean of these, or one-fourth for the average depth of the flowage back of the dam, it would require a dam fifty-six feet high to hold an inch if the water surface were one acre; twenty-eight feet high if the surface were two acres, and fourteen feet high if the surface were four acres.

You see at once this is quite a pond, and yet we have not allowed for evaporation. This is about four feet for the year on an average throughout the country, of which nearly three feet will be in the dry season. If this came off the bottom it would be trifling, but it comes off the top layers, and amounts to 15 or 20 per cent. of the supply. In this way you can easily judge of the value of a reservoir if you know

the height of the dam and the number of acres it will cover at that height. You will find few basins stand the test. Most of them will be too narrow or too sloping or more often both, while those with a large wide bag back of a narrow gorge suitable for a safe and cheap dam are very rare.

Most of those we find suitable have a habit of having little watershed back of them, while those that have a good watershed are too often very wide-mouthed. If the watershed is good enough to insure filling the reservoir in ordinary years, then it is quite certain to bring in considerable sediment in wet years. I have seen several completely filled in this way in one wet winter. It is possible to dredge them out, but you had better let the other man undertake the task. It is a nice amusement for a tenderfoot.

It looks like a simple matter to build a dam fourteen feet high in a narrow gorge. But when you have gone to a safe foundation your dam is more likely to be twenty feet high. And the gorge that to the eye seems so narrow may be fearfully wide when measured by your purse. If your watershed is reliable for medium years there is certain to be a large overflow in very wet winters, and to provide against that with certainty is no trifling matter. It seems very easy to run a pipe or a box through a dam of earth, but it is still more easy for the water to cut it out. You have seen, on hillsides, sheets of shelving rock covered with soil that was formed from its decomposition, and about as close to it as you are likely to park anything but the best clay. Yet you have seen water follow the seam between the soil and the rock for many yards under almost no pressure. So it will do with any seam between earth and any hard material. When it once gets through under pressure the fate of your dam is sealed. Many other precautions make the building of a safe dam on a reliable watershed so expensive that even where the proper basin exists you are paying too much for the amount of water you get and will do better to resort to some other means.

A small reservoir, to be filled by a flowing stream or wells, is quite another matter, especially where the stream does not flow through the basin but is diverted into it. Where reasonable precautions are taken these are nearly always well worth what they cost, for there is no large overflow to provide against, and they can be filled more than once a year.

In many cases they are a necessity, as where the water is cold. The temperature of irrigating water is of great importance, yet it is constantly overlooked by novices in irrigation. For many things every degree that you can add to its temperature will mean dollars in the results. To be useful it must be warm, for cold water will check many kinds of growth, so as to make a practical failure of the crop. I have seen corn completely ruined by water from mountain streams, sickly and not yet in ear in August, yet the owner did not seem to

suspect what was the matter. For this reason I would prefer a reservoir wide and shallow, even at the risk of more trouble from vegetation. You cannot have the water too warm for the best results, with most products.

"Such reservoirs should also be used in hundreds of cases where one now deems them necessary. All experienced irrigators know the difference in efficiency between so many inches of water in large heads and in small ones. Many a man is now irrigating from a well who does not know this or does not know the extent of the difference. Even with a well flowing several inches of water, either artesian or by pumping, parties are losing efficiency seriously by not accumulating that head so as to make a large run. It is not possible to frame a formula by which this may be calculated, but it is safe to say that a man with a ten-acre tract, and a well furnishing one inch of water, had better spend a thousand or fifteen hundred dollars for a reservoir, or else unload on the first tendrfoot and buy under a ditch giving large heads, as most of them do. The San Diego Flume Company got into its present trouble largely by the stupidity of directors, who ignored the plans of the projectors and limited consumers to a continuous flow of a single inch.

"For valuable products, and for almost all products, one must have an irrigating head of considerable size. It should be from three to five inches for each acre to be irrigated, according to the texture of the soil. Where the soil is too porous for good furrow work the resort must be to flooding, it should be at least ten inches of head for each acre to be irrigated. All this means high efficiency of the water. But it also means a large reservoir.

"It does not, however, imply that such a reservoir must be cemented. Such a course will generally be expensive, whether with cement or asphalt, but almost all soil can be puddled with animals, and many soils will puddle themselves well enough in a little while. As an inch will cover an acre half an inch deep in twenty-four hours, and half an inch will wet about five inches in depth, the seepage on any very tight soil would not amount to much compared with the increased value of the greater irrigating head. When this reservoir raises the temperature 15 or 20 degrees, the combined effect will generally justify considerable size in the reservoir. One can generally be built by home labor and need not be deep enough to require very much care with the outlet pipe.

"Many think the evaporation from a large reservoir is too great for economy. During very hot weather it would average about one miner's inch a day from the surface of one acre. In cool summer weather about half that. If it were very shallow this would be increased and there would be still more loss if there were very much vegetation in it. But even these losses, as well as the cost, will be generally more than offset by the effect of the increased head and the

temperature. And the larger head means not only more work out of the water, but less work and worry out of the man who handles it.

"There is one type of reservoir not yet in general use, but which most people seem very much afraid of. If water cannot be stored above ground, the next best place is in the ground. How many thousands of inches went into the sea a year ago with a short year staring us in the face? How much public wealth was thus thrown away for fear it might rain and people thus have a little labor for nothing. And this is done after it is certain that we cannot have enough rain to keep the subsoil as wet as it should be. How strange it is that it takes people so long to learn that if you try to cultivate by irrigation a thin sheet of soil on top of an ash heap, that the dry ash heap will sap it upward. There is capillary attraction that no mulch can break up and in trying to keep it wet you are throwing away good summer water that is needed elsewhere.

"But suppose it should rain? Well, suppose it should. Many of you remember the great wet winter of 1883-4, when the ground was for weeks like a duck's back, when all the streams ran all summer and fall to the ocean, when springs broke out and ran a year or more on dry hillsides, and tule patches and willow groves started on the late dry slopes. Do you remember any harm that was done by it to anything that was on ground where it should have been? Do you remember any injury to the orange crop of that year or the next? Did it hurt the deciduous trees or the fruit except the old-style orchards in swales and in low ground? But do you not remember the effect of the water in the ground that was carried through to the next year? Do you not remember how the next year was short in rainfall, with a very bad distribution, yet that the effect of the great wetting was plain on corn and other summer crops, as well as on trees eighteen months afterward? If you do not remember find some one who was there. It is time we stopped wasting wealth for fear of a little unnecessary work, at a time, too, when there is plenty of time to work. Had the water that during the last six winters has run away from the lower end of the ditches been forced into the ground by rates so low as to induce people to use it, we should see a much brighter green on most of the crops than we shall see this year, even where there is a trifling shortage of summer water."

A NIGHT IN AN OLD ENGLISH ROADSIDE INN, AND WHAT I SAW THERE.

AN OLD UNUSED "MORLAND" INN SIGN.

BY LODIAN LODIAN, c. e., Paris, France.

(Original for this Journal.)

In an out of the way part of England, where the postman is unknown, and letters are brought by the first chance wayfarer or neighbor to the small group of cottages in a sequestered nook in the hills, a small inn without a sign is to be met with, where once spirits were made and sold in uncertain quantities; but as the supervisor of excise had been ignored officially, the spirit business was stopped suddenly, when the matter was officially investigated—much to the chagrin of the mild looking landlord and small farmer, who saw to the business, as well as his crops.

He sometimes explained in confidence how it came about, and said that he told the justices that his great-grandfather before him—this he was certain about—had sold to and treated friends to little drops of spirits, before there was any law and fuss about the matter.

It was the law that was the bother, not his spirits; and that he had a sign ready to put up, painted by George Morland, the best he ever painted. A collector of Morland's celebrities, on the bench, wanted to know what the painting was like.

"I might be fined for having a sign not put up," he answered. "I do not know if I am safe a mentioning of it. What is the law, gentlemen on that point?" he added.

The clerk was appealed to. That opinion was decisive: That he might, or might not, carry on business on licensed premises, with or without an inn-sign. This profound judgment did not convince any one about the construction of the act of Parliament, and the unlicensed inn-keeper said that he would never put up his Morland sign 'till he knew for certain.

He paid the fine inflicted upon him, and suggested that the judges might let the amount of fine go towards a spirit license he meant to apply for. Of course this suggestion was not entertained by the bench.

As a favor he showed me his "George Morland" picture and said it was printed from life. There was Farmer Darnell's horsestall, his grey mare with the weather-girth to the saddle, just as it was used

when the mare was in foal. She was tied up by the bridle to the orchard rails, while old Darnell went in for "mammit" or lunch. A maid was at the cow-house door looking out on the field of young approaching corn, shown by the level rows of bright green shoots.

In the middle of the field was the scare-crow, or the stakes that formed its anatomy, with some of the tatters still on it. By it was a sturdy young tramp, partly undressed, making an exchange of garments to suit his taste. Both the scare-crow and tramp being shirtless, this garment was omitted from the *al fresco* toilet.

A militiaman's old coat and a wideawake hat, were engaging the tramp's attention at the moment the artist caught sight of the main character of his painting.

Unlike some of George Morland's pictures, this one was finished in all details, and in as good order as when it was first painted at the little secluded cottage farm.

Naturally, I longed to become the owner of this unique painting, and made a substantial bid for it; but to no purpose. except to create an unfavorable impression in the old landlord's mind that I wanted it cheap, so I decided to talk about it later on. In the morning we arranged to explore the old inn thoroughly with a couple of companions whom I will introduce.

* * * *

Before descending, Alton had full view of the roofs of Langloine, and noticed in the valley between the ridges it showed to be larger at deepest parts of roof: the water-outlet end of valley, with three gutter-holes. Yet the roof ridges were horizontal, and though the fall of gutter was more than usual in pitch to carry off water, there seemed a double purpose to get snow-water off and cover up double walls.

"Does the width of the kitchen contract at one end, so as to give that valley wider outlet for water," asked Alton.

"Yes" said Mr. Clifton, "the kitchen is nearly three feet narrower at one end; that allows the roof-plates to be parted three feet at lower end of valley formed by the adjacent high-pitched roof, so that snow that fills it when it thaws, settles without checking flow of snow-water, so that there is none kept back to soak under the tiles to rot the timbers, and snow-boards on tiles are not used, they, often, being another source of decay to a roof.

Alton admired the plan, which he had never before seen on any of the many old or modern churches or buildings with ridge and valley roofs. While on the roof Alton resolved to examine the internal construction of the kitchen-roof timbers, and sprang, like a squirrel, from the ladder-way on to the tie-beam over the oak partition and crawled along it to the central ribs, or braces, which sprang from the middle of beam like two spreading horns, reaching out to the junction of collar-braces and partitions.

He saw that these substitutes for king and queen posts had been

hewed out of timber that grew to the proper curves and were haunched over the tie beams by claspings-loops; this spared weakening the tie-beam with mortices or horn-beams with tenans.

The massive oak columns ranged on each side of the kitchen were intact, though looking as pilasters to the walls, to which they were linked by the wall-plate at top and by massive carved spanded brackets springing from the shaft of ear-columns to the wall-plates. These devices giving stability to the roof by scientific long secret staircase to tower between the walls.

The contraction of width at one end of the kitchen was now obvious to him and it explained the double purpose of the wide valley gutter and also the long stairway to tower concealed between the two walls.

With a lamp Alton examined the roof from the upper portions to the ridge-plates and found that every rafter top was recessed slightly into the ridge-plate, as each one also was at the wall-plates and fixed with oak pins. The rafters were all made four times deeper and twice wider at the wall-plate than the ridge—so that the roof-timbers seemed as firm and as true as when first built.

The same surface dressing of semi-transparent composition was varnished over all the timbers and oak panelling here as elsewhere in the building.

In groping amidst the dust and cobwebs, he found tucked between the junction of the curved braces a small parchment packet. This he secured, hoping it might prove a relic of value to add to the treasures of "Langholme."

He was glad Mr. Clifton had pointed out this admirable piece of ancient architecture, perhaps without anything like it in any other existing roof, ancient or modern.

In returning they passed into the old banqueting hall. In one corner was a pair of parish stocks of the date 1349, when an act of Parliament called "The Statue of Laborers" was passed authorizing their erection and use in every parish for laborers' punishment who would not work for low wages. In the same year, 1349, was instituted the most noble Order of Garter by King Edward. These facts he stated to his companions, observing how intimately kings, priests and class deputies work together in state, though they do a little squabbling at times.

He closely examined the parish stocks of 1349, saying that they revealed parish economy and perhaps its false equity of justice, as they held two prisoners at once and perhaps the same duration of sentence was operative, however the offence of each varied. He had read that two hours cramp was torture for a strong man—as the man's back had no support, being hand-tied in front—sometimes fixed in hand-holes as well as by the legs.

The stocks were of roughly hewn logs of oak. The holes for legs

were V-notches cut into the edges of the logs, which, when one was placed on top of the other, formed square holes angle-ways. A hinge at one end and clasp and staple-eye padlock at the other, formed the fixing.

Mr. Clifton said, "My sturdy ancestor, Harold Clifton, has left his mark of irony well secured to one of the stock-holes," and he removed a strip of silk, which appeared, by the color, to be part of some old banner and revealed in the hole a badge of "The Most Noble Order of the Garter" fixed there, with a rusty nail driven through it, and a strip of parchment as well.

Alton read the doggerel verse written on the parchment in bold lettering:

For the poor are those stocks, to jam laborers' legs—
For the rich is a garter for which each lies and begs.
Tho' the poor make men rich, who prey on their toil.
The rich in return claim rent, tax and spoil.

H. C.

Mr. Clifton said: "The yeoman breed of 'Ironsides,' of the type of my ancestor, is dying out fast. The flunky spirits of the age finds its second hand braggadocio in the press, and fancies itself brave at reading the bunkum."

"Heigh-ho!" sighed Mrs. Maythorn. "How this world seems ruled by gnats and moths."

In the kitchen was an old order of the bath badge. That reminded her of washing her aftermaths—as the recipients of the bath knighthood formerly were required to have a wash before entering the kingly presence to be badged and dubbed a knight.

What an unwashed topsy-turvy world this is!

Alton now examined the relics. Looking closely at the linking of the rings of chain-mail, he saw that every alternate ring was riveted with a needle-point rivet.

The antique saddle with high pommel and cantle had the stirrup-leathers hung on the oak bars of trees; which were slightly recessed where the stirrup-leathers had worn them by constant use. The recess was four inches further back than in the modern saddle-bars, fixed partly on the pommel-point.

"As if the rivetter-up of tree-bars made his piece work fixing dominate over the rider's comfort and safety," was Mr. Clifton's comment on modern riding saddle bar fixings: "quite away from the rider's equipose of seat on the saddle, which should have the foot-pressure on stirrup, fairly under the rider's weight."

The smithy door was unfastened. They entered.

"Here!" said Alton, "is my ideal state room of noblest chivalry—the workshop of productive toil for other's aid and service."

Alton recalled the yester-evening joyous scene, saying to Mr. Clifton and niece.

"How unconscious are most people of the joy they unthinkingly

give to others, and will us the true words: the gift can never be redeemed. The Mayers moulded their own joys, which were made the joys of others. You will never know the joy your smithing scene and song gave to me in this place, because I cannot express it; though every thrill of joy still lives. Perhaps, Miss Clifton, if I ask you what gives you pleasure in the hard toil for woman's strength, your answer would supply me with the words I might use to tell my own feelings of pleasure."

"I fear I cannot word my pleasure," said Daisy, "except to say, doing the work gives a master thrill akin to nature's subtle power. One rules with nature's secret forces; rock, air, water and fire. The stubborn steel one changes to glowing liquid, and to the fine yielding film of steel to spring in myriad motion, breakless. The water serving for the tempering agency.

* * *

HEARD IN THE BAR-ROOM.

The police of Saxwych knew Slimy Sam, the skin dealer, and went at once to his home—a wretched two-room cottage and some tumble-down sheds at the back. The van was at once noted, and the man came home late, and did not seem at all disconcerted by the visit of the police, asking them in an off-hand way if they had brought him any skins, rags, bones, or bottles. They explained that all they wanted that time was Jumbo.

"So do I," said the man, "but he has gone for good—gone to sea, I have heard, and he chalked it here in the inside of this cupboard. Dicky says it reads, 'Gone to sea; I hope when I come back to see Dicky, but not you'—Jumbo."

This was what was written on the door. A small block bed for sleeping was on the floor there. "Out of the way of the rain, for Dicky," said the man.

The inspector could glean no more about Jumbo except that he was a bad 'un and that he had tanned him for not minding what he said, and letting some fellow take the pony and van from him into a wood, but that the load of skins was safe; and before they had been home an hour, Jumbo started off for the train, saying that he had too much of Saxwych, and that he should do as other boys do—go to sea.

"Then I have to find out what you have not told me, Mr. Sam," said the Inspector.

"I'll excuse it," said Sam, "you are expected to do a little for your money."

The two rooms were easily overhauled, but the "summer house," as Sam called his cart shed, was a tougher job; skins, bones, bottles, rags and bits of metal—all tempting for fever microbes to use for temporary purposes.

The pony van was there empty. It had not been cleaned inside, the bottom boards showed traces of lead marks, and some small shreds

of sheet lead in the bottom, but not a trace of blood, none of its cake of dirt having been disturbed by anything but lead.

The police inspector who questioned the man, did not hurt his feelings in the least by asking him of what his "swag" consisted that he hid it under a cloth in his van that day in particular?

His answer was: "That is what I pay rates for, to keep you blues to find out;" and he put his tongue to bulge his cheek out at his interrogator

"I have found out; it was lead," said the inspector. "Where did you get it from?" The man winked his eye and said.

"I have not got it now, it went to the melting pot—that's enough for you, and ends it. You blooming 'blues' look another way though the furnaces and crucibles are always going, for 'swag' gold and silver. You are afraid to tackle the big bugs, because they are big tradesmen, perhaps town-councillors and the like, but you are sharp on us if you get a chance. We cannot put any of you into better berths as those chaps have so many chances to do. If I were a villa-cove, you would not go into my coach house and nose about, though you knew that I kept a 'fence' running night and day."

The inspector asked about Alton's hat that was lost in the wood.

"About my cap, that was lost in the wood, you do not bother. Jumbo found the hat I winged it, and as I cannot swear it is mine, you can have it. What a difference it makes, what you find, and who you are that finds something. If old 'money-grabber,' my landlord, Sir Josiah Rangstan, found out a bucket of water on his land, though he had stolen the land, or—what's the same thing to those who are starved off the land—bought it of the County Council, as he has done the road waste, they call it, or the road to Moxbridge. That water would be his and his'n's forever; and if made into big water-works, he could charge the people for his water, what he liked, or they might famish if they could not pay his rates. They are the coves you bow timidly to, though you know their big games at swag, and the devil roast those who can't get any."

"Anything else about what was done in the wood where you found the hat?"

"What was done there?" asked Slimy Sam.

"A murder, just about the time you say you and your Jumbo were there."

"Is there any reward offered yet?" asked the man.

"Yes, two hundred for the young woman alive or dead, or for the discovery of the murderer."

"That's my blooming chance to have been so near and not in at the death, or in time to baulk the murderer before tried. For that, the best of the doing, you see, I should have got nothing, perhaps have been fined for trespass. The parsons are fly, they let wrong be done

and get their rewards for running it down from the pulpits, instead of stopping it in time."

The inspector had let the man talk, to find out by a stray word if Sam knew anything of the murder. His bait by which he hoped to get hold of Jumbo was put before the father.

"Mr. Hay, of Langholme, has told me to offer you ten pounds if you will produce your Jumbo to give his evidence before the magistrates."

"Ten pounds!" exclaimed the man. "Ten pounds for Jumbo, who was never worth a 'quid.' There! it's done! He is gone! and took my watch, that was his'n, till I took it from him. No guvener, the ten quid is lost. I have a little girl a beauty, when she laughs; up to every dodge I can teach her, and some I never thought of. Tell Mr. Hay, with my compliments—axing his pardon if he thinks I am rude—he shall have her in her Sunday togs, with clean face and hands, for five quids down this week, as I am hard up, to pay my rent, and that's to old money-grubber for sheds not fit to put pigs in, let alone a Christian, as I hope I am, and a better one nor him any day."

"I will certainly tell him what you say," said the inspector. "Don't forget the offer for the boy; and anything you have forgotten now, send on to me in a letter, but do not ask for money; your reasonable expenses will be paid if it turns out to be true what you say and can prove."

"There you are again, guv'ner. If I spoke God's truth itself, what would that count against a rich man's word? But I'll have a try after a little money somehow. May I crack a crib to beg for that two hundred pounds reward; and if I find the murderer, may I give him a topper to make him own up?"

"You may leave that for us to do; the reward will be yours all the same. You might put on the wrong hat or coat by mistake, if you missed getting hold of the culprit in a private dwelling or nabble the wrong head."

Slimy Sam grinned, saying:

"I know the law of things. You may feel safe from having to go and look at the pretty bricks with a coat of arms of England always near; if you get a bit of paper and the price of the things you take with debtor on it, you're safe then."

The inspector left him to make his report to Waxbridge. The man's statement about the lead was impudently consistent as some had been stolen from a house-top on the line of road he had gone. The police found the wholesale tradesman who dealt in old metal with the weight, etc., duly booked, but it had been melted, so that identity was stopped and no justice done.

The inquiry at Saxwych so far, removed one conspicuous item of suspicion and made the contemplated searching operations of the police more circumscribed and definite near the scene of the crime.

The game-keeper, at dusk, betook himself to the beer-house where

he met many of his associates and some strangers, amongst whom was the sergeant of police now disguised as a travelling Sheffield-ware man, with a small pack of electro goods and some clasp knives, these latter suitable for the rough work of farm-laborers. The murder was the main topic of talk, but the keeper said "It will be time enough for me to talk of it when it is found out," and joined his companions at a game of cards.

Nothing to help the policeman transpired; he left before the others, so as not to be seen to enter "Langholme" farm, and also to watch the Reaper leave and track him to his cottage, so as to be sure that he went no where else, before going home.

MEN OF THE WEST.

We sent you o'er the sun-lit sea—
 Men of the West—
 To carry peace and industry
 To war's unrest.
 No grateful homage found ye there.
 Nor honor due;
 A sullen land, with the threatening air,
 Admitted you.
 Ye faltered not at burning sun.
 Nor fever's might:
 Nor when you found the task begun
 A bitter fight.
 Ye toiled amid a people rude,
 with patient zeal:
 Nor lifted at ingratitude
 Th' avenging steel.
 A blighted land, that could not see
 The proffered light:
 Nor comprehend that liberty
 Of truth and right.
 They struck the hand that was their hope
 A cruel blow—
 The hand that had not stooped to cope
 With such a foe.
 Ah! bravely then ye faced the blast
 And joyfully bled:
 And perished, fighting to the last,
 Our gallant dead!
 We cannot weep at such a death:
 Nor toll the bell.
 While, with a deep exultant breath,
 Our bosoms swell.
 We trusted, and were not deceived—
 Men of the West:
 Ye fought and died as ye have lived—
 Your Nation's best.
 And ye, who live to toil anew,
 We trust as well
 As those who, faithful, toiled with you
 And, faithful, fell.
 —Charles C. Ballard, Union College, '99
 in New York Mail and Express.

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs. Also sketches or plans of convenient and commodious barns, hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us improve the appearance of THE AGE?

FOR THE FARMERS.

The Illinois Farmer's Institute proposes to inaugurate a "Little Red School House" campaign. Plans were laid recently for the most important work in Agricultural Education ever set on foot in the State, The Illinois Farmers's Institute is an organization under the laws for the promotion of Institute work among the farmers. The Farmer's Institute is a sort of University extension movement. It brings instruction in crop growing and live stock breeding, right to the farmer's door. The Agricultural Colleges are growing constantly and largely in attendance but only a tithe of the Agricultural population can go away to college, and hence instruction is being brought into farming communities where all may have a chance to take advantage of it. This work has been of remarkable growth and astonishing benefits.

The Illinois Farmer's Institute is composed of one member from each Congressional district and has a general supervision, over the work in this State. Three kinds of meetings are held—one State Institute annually and Congressional district, and County Institute. These latter are usually held once a year, sometimes oftener.

Great as is the work done by those meetings, it has long been felt that they were not brought close enough to the

people and at the last State meeting a committee was appointed to consider the plan of organizing Institutes in every township in the State, to be held once a month except in the harvest months of July and August. This Committee devoted sometime to the study of the problem at a recent meeting at the Sherman House.

Those present were Col. Chas. F. Mills, Springfield, Chairman; G. A. Willmarth, Seneca, President of the State Institute; Amos F. Moore, Polo, and C. J. Lindemann and W. R. Goodwin, Jr., Chicago. An outline of the plan adopted is as follows: The Committee will request from the Presidents of the County Institutes the names of the representative active farmer in each township to organize the Institute.

In case these men are not named the supervisor in each Township will be commissioned to put the movement on foot. He will be requested to associate with him a school teacher in the Township, and one woman, who will look after the Home Making part of the program. A constitution will be drafted by a sub-committee (Messrs. Mills, Lindeman, and Mann) to be used as a working basis. Another sub-committee (Messrs. Mills, Willmarth, and Goodwin) will draft a program of the topics for discussion for each month in the year which may be varied to meet local

conditions. Yet another sub-committee (Messrs. Mills, Moore, and Goodwin) will prepare a scheme of instructions that will facilitate the work of organizing and conducting institutes.

It is proposed that one day of three sessions be taken in each month—the morning to be devoted to topics of especial interest to the men,—the afternoon to be taken by to the women and evening reserved for young people. The interest of the rising generation will be enlisted by holding prize essay contests in each school on some subject connected with farm life, and the best essays written by a boy or girl respectively, will be read at the evening session of the Institute.

Further aid in this work will be sought from the country school superintendents, the officers of county agricultural institutes and the press of the state. It has been demonstrated that the program of the papers, discussions, debates, recitations and music rendered at Institutes are the most powerful factors yet applied for the improvement of the material and social welfare of the farmer and this new movement bringing the ramifications of this effective educational system within the reach of all, the committee hopes will receive the most cordial support:

PRACTICAL IRRIGATION—POTATO CULTURE AS PRACTICED AT GREELEY, COLO.

Greeley has become famous and rich by raising potatoes. 10,000 cars yearly is only an average crop, these are grown by irrigation. How is it done? During the winter months the potatoes not large enough for market, are carefully sorted and only the best specimens of the kind being retained for seed. Those having deep eyes, or full of prongs, or growing small at one end, are discarded and fed to stock. The seed is then cut at planting time into sets, having from two to three eyes each. The ground is plowed deeper than for any other crop; planting is done with an Aspinwall planter manufactured

at Jackson, Michigan, this planter being used by all, as other makes of planters does not give the satisfaction this does; it marks the next row, plants any required depth, does its own covering and plants each set a uniform distance from the other, generally about seventeen inches apart, in the row and the rows about thirty-eight inches apart.

These rows are run on an incline so water can be run between the rows from one side of the field to the other. About the 25th of May seems to be the right time to plant the late crop, this brings the setting on, and growing time in August and September, when the nights are cooler than in July, which effects the earlier planting. Water should not be turned on until the tubers have attained the size of walnuts, if the weather is favorable so they continue to grow. They should thus have a light irrigation by furrowing out between the rows and turning water into each alternate row, and let it run down until it reaches the opposite end, then shut off, turn into next alternate row, etc., in ten days they can be again irrigated, taking the rows that were not irrigated before.

In another ten days they can be again irrigated and if the weather be generally cool irrigate every row but in no case or at no time allow the vines to be submerged in water, this will cause the vine to scald and die. Three irrigations had ought to make a crop in any country, when the average rainfall is fifteen inches or more. Water should not be applied after the skin has once set on the tubes, as it has then commenced to ripen, and if irrigated will start a new growth instead of making the first one larger. There are many minor details connected with potato culture, by irrigation that I will be glad to answer by simply enclosing stamp, which if here given, might make this article too long and tedious to those not interested. The crop of potatoes grown here annually, bring the farmers from two to four million dollars, according to price

obtained; good potato land nicely located, with water rights in good ditches is worth from \$50 to \$125 per acre.

The American Tamworth Swine Record Association recently elected the following officers: President, Edwin O. Wood, Flint, Mich.; Secretary, E. N. Ball, Hamburg, Mich.; Directors, T. L. Endsley, Charleston, Ill., John Fulton, Jr., Brownville, Ont., and F. H. Rankin, Jr., Flint, Mich. The Secretary reports the Association to be in a very prosperous condition and says that the Tamworth breed of hogs is growing in favor among breeders in the corn belt and throughout the United States and Canada.

IRRIGATING THE GARDEN.

The following regarding watering the garden is from the farm bulletin, "The Vegetable Garden" by C. H. Greathouse, and is appreciable at this season.

"But frequently dry weather continues so long that it is impossible to preserve sufficient moisture by tillage or any sort of mulching. It then becomes necessary to water the garden. Where there is connection with city water works the supply is ample and easily reached. In other locations various forms of cisterns and reservoirs are employed. When it is possible the reservoir should be a few feet above the level, so that any part of the garden can be reached with a hose or a V shaped trough. The proper application of water appears to be very simple, but is in fact quite difficult.

It is not unusual for an experienced person to sprinkle the garden every day or two and think he is relieving the drought. The effect of such treatment is likely to be harmful, especially if the sprinkling is allowed to leave a crust about the plants. In watering, the earth should be thoroughly wet, so that the moisture will get to the lower and outer roots of the plants. In order to check evaporation after sprinkling, the surface should be broken as soon as dry enough to work. The watering should be repeated when it is evident, upon careful watching, that more moisture is necessary. It must be remembered that the small, active roots, which take up moisture and plant food, are most numerous at the extremities of the large roots and at a distance from the stem. The water must be so given as to reach these small roots.

The best time for watering is generally thought to be at evening, but Bellair says: 'In the spring, in the middle of the day, because the morning and evening are too cool; in the summer, at evening because the days are so hot that a great part of the water given during the day would be evaporated immediately; in autumn, in the morning, because the nights are cold.'

Mr. Saunders says: "Water at any time when the plants need it, and water thoroughly. When I am told that watering in the sunshine at noon will burn up my plants, I answer that the plants will certainly burn up if I do not water them."



PULSE OF THE IRRIGATION INDUSTRY.

A CHANCE FOR SETTLERS.

Donald Bradford, manager of the Montana state and land commission, reports that the commission contemplates giving settlers an opportunity to buy water with labor, in the Clark's Fork Valley district. This valley is in Carbon County and it is claimed can be redeemed and made fertile by the construction of an irrigation ditch, such as it is proposed to build. The work of surveying the ditch is soon to be commenced. This section was once surveyed but the survey was rejected so a new one will have to be made. Mr. Bradford estimates that there is enough land in the district capable of irrigation to make farms of 160 acres each for forty families. The *Daily Independent* of Helena, Mont., gives the following account of the enterprise and what is proposed:

'The plan of the commission is to have the settlers construct the irrigation system under state supervision and direction, the title to remain vested in the state, which will pay in warrants for the labor employed in the work and accept the warrants in payment for perpetual water rights. The charge for those rights is to be based on the actual cost of construction. The warrants will also be accepted in payment for merchandise by Bridger merchants.

The only interest of the state in the enterprise is to secure the settlement of the land, and to this end every assistance possible is to be given to the settler by the commission. It is the first time in the history of the country that a state has undertaken the management of the construction and maintenance of a system of irrigation for its arid lands. Should the experiment prove a success, as it promises to, it may become a prime factor in the future development and greatness of a state second to none in point of possibilities.

'The state arid land grant commission,

to quickly inaugurate the building of homes in the state, has undertaken to construct a canal to reclaim several thousand acres of very fine land adjacent to the Clark Fork river in Carbon county,' said Mr. Bradford.

'It is hoped that a sufficient number of actual settlers may join this colony to build the water system and thus prevent the necessity for the employment of outside labor, as it is the purpose of this commission to aid home-seekers in every way to secure and improve their homes at the least possible cost and without profit to any one for construction. As it will be seen in the accompanying form of certificate, title to the canal remains in the state and only the actual cost of construction, maintenance and operation will be charged.

To prevent the settler from turning speculator in land, his water right purchased must equal in units the number of acres filed upon and in this connection it is deemed proper to suggest that eighty acres utilized to the best advantage will equal in net profits 160 acres farmed with hired labor.

The terms of payment have been made easy, so that while the state is secured, the settler may easily meet his payments. The farmer will, as far as practicable, be employed in maintenance work and be given credit on toll charges. Construction will begin June 1, and will be pushed to completion as rapidly as possible. It is desired that all the land shall be taken and appliances for water filed and teams and men ready to begin work on that day. Each farmer or purchaser of a water right will be given a section of the canal to build and will be paid by the yard of material at the ruling rate, which will be announced at the proper time.

* * * * *

In the past, the only offer that has

been made to the farmer of the semi-arid parts of the country has been to locate under a corporation ditch, purchase a farm at a maximum price, pay a big price for the right to receive water, and then annually pay a perpetual rental of a couple of dollars per acre for the water that was necessary to the growth of his crops. Even with these expenses, the occupant of the irrigated farm made money and there has never been any trouble experienced in selling such lands. That being the case, the opportunities offered by this irrigation proposition—the many advantages—are too apparent to require elaboration. If a farmer can make money when he has to buy his farm, buy his water right and then annually pay a big price for his water supply, he certainly cannot fail to make money when he secured his land without cost, does the work on the construction of the irrigation system and gets paid for it, and is then given water each year at just exactly what it costs the state commission to sustain the system.' ”

GREATER AMERICA ASSURED SUCCESS.

Great as was the ultimate success of the

Trans-Mississippi Exposition at Omaha last year, it is a fact the management was sorely distressed up to the very day of its opening over a fearful prospect that its great buildings would not be filled, and indeed some of them were not filled until the exposition was well advanced. The Greater America Exposition, which will open at Omaha July 1, is faring better. Two months and a half before the opening day the great Machinery building was filled and applicants for space were receiving short allowances. Over half the space in the Manufacturer's building had been disposed of, chiefly for live exhibits in which model factories are shown in active and actual operation and turning out products. Exhibits sufficient had been secured to fill the government building, including the war museum and displays made by the signal services and the other department of the government. The fine arts building was half full of exhibits of superior worth and attractiveness. Similar progress has been achieved in every other department. The liberal arts building will be occupied by the main colonial exhibits and is certain to be more than full.

THE GIRL THAT BELIEVES IN ME.

That simple, trusting lassie,
The girl who believes in me.

There are some with greater beauty,
And some that wittier be;
But there's only one wee girlie
That ever believed in me.

She's never been to college,
Knows not her A, B, C,
Yet she has stores of wisdom
Or she'd not believe in me.

She's not an ancient lassie,
Her years they are but three;
Which, maybe, is the reason
That she believes in me.

—Jan Lyall in Truth.

WITH OUR EXCHANGES.

SATURDAY EVENING POST.

Ian Maclaren, who has done very little literary work for some months, has just written for *The Saturday Evening Post*, of Philadelphia, an important series of four short stories, under the general title, A Scots Grammar School, the first of which will appear in the issue of June 3. In these stories the author returns to the Scotch town and folk he knows so well, and depicts the scenes of his own boyhood with the same sweet humor and pathos that brought Beside the "Bonnie Brier-Bash" into such immediate and lasting favor.

Muritown Seminary is drawn from Stirling Grammar School, where the author prepared for the University of Edinburgh.

McCLURE'S MAGAZINE.

For a description of Marconi's wireless telegraph that anybody can understand, and an account of its latest achievements that everybody will be interested in readers may be referred to the June number of *McClure's Magazine*. The article is written with the assistance of Mr. Marconi himself, by Mr. Cleveland Moffett, who himself sent and received messages by the wireless telegraph across the English Channel; and it is fully illustrated from photographs taken expressly for the purpose.

Another interesting and valuable article in this number of *McClure's* is an account of negotiations between Admiral Dewey and the Spanish commanders that led to the final surrender of Manila practically without any fighting between the land forces. It is written by Oscar King Davis, Manila correspondent of the *New York Sun*, from the diary of M. Edourd Andre, the Belgian consul at Manila, through whom the negotiations were conducted. It is, therefore, authoritative; and it is a story that has never before been told. It

gives new illustration of the rare tact and sagacity of the American admiral.

SCRIBNER'S.

There will be four short stories in the June *Scribner's*, suitable for the season when the summer travel has just begun. Two of the best known American writers, Henry James and Joel Chandler Harris, will be represented, and two new writers, William Allen White (famous for his editorial, "What's the Matter with Kansas?") and Robert Shackleton, a New York journalist. Governor Roosevelt concludes the story of his regiment with a striking letter from a school teacher, telling how some of the Rough Riders adjusted themselves to the conditions of peace on their return home. It is a tribute to the affection in which the Colonel was held by his regiment.

The journal of the Association of Engineering Societies for March, 1899, contains the following papers: The efficiency of the Bicycle, by Robert H. Fernald; Experience in Sewer Construction, by L. M. Hastings; Maintenance of the System of Separate Sewers at Newton, Mass., by Stephen Childs.

Mr. Fernald describes the results of experiments at the Case School of Applied Science, Cleveland, O., to determine the effect of various conditions upon the efficiency of the machine. The several experiments, each represented by a diagram, include the following comparisons: chain and chainless bicycles, bicycles of different grades, bicycles in good and in bad condition, the effects of oiling, of chain protection of difference of gearing, and of inflation of the rear tire.

Mr. Hastings relates experience gained in the city of Cambridge, Mass., respecting the effect of the character and condition of the soil upon the size, character and cost of a new system.

THE FORUM.

Among the more important papers in the June Forum are: "The Crisis in the Church of England," by Francis Allston Channing, P. M.; "The Value of Porto Rico," by Robert T. Hill; "England's Decadence in the West Indies," by Brooks Adams, and "Some Light on the Canadian Enigma," by A. Maurice Low. Educationists who have been contending that teachers should have equal professional status with physicians will find some cogent arguments against their claim, in an article by Dr. J. M. Rice, on "Why Teachers have no Professional Standing." Two serious obstacles stand in the way, says Dr. Rice, of such recognition being accorded to the teachers. One is, that the teaching diploma is of itself of little value; the other, that the teachers themselves cannot agree upon the most elementary points in educational matters. Although doctors proverbially disagree on many points, yet there are a great many on which they do agree and which constitute a wide platform on which all members of the profession stand. The papers will doubtless evoke much discussion in educational circles. Under the captain,

"Insurance of Property against War Risks," Lieut.-Com. W. W. Kimball, of the "Vixen," calls attention to the apathy of the Government in respect to torpedo-boats. Commander Kimball adopts a satirical vein throughout his whole paper, which, however, makes his remarks none the less forceful; and he points out that, while we have been dallying with the submarine boat idea, France has availed herself of all the details hitherto made public, and has applied them in the torpedo-boats she is now constructing. Commander Kimball contends that torpedo-boats, especially submarines, constitute the best form of insurance against war risks.

REVIEW OF REVIEWS.

for June just arrived as we go to press and among other interesting and instructive reading we note the following: "The Trusts—a Rush to Industrial Monopoly," by Byron W. Holt, which is the most accurate and up-to-date list of the great corporate monopolies that has yet appeared. "Oliver Cromwell," by W. T. Stead and "The Mormons in Mexico," by Charles W. Kindrick.

THE A TO Z OF PESSIMISM.

Little babe,
 Mother's prayer.
 Little boy,
 Lots of dare.
 College youth,
 Football hair.
 Fearless man,
 Country air.
 Pretty maid,
 Lovely snare.
 Little buggy,
 Aged mare.
 Priestly priest.
 Youthful pair.
 Little kids,
 Wear and tear.
 Troubled life,
 End in sight.
 Dread despair,
 Graveyard scene—
 That's, all I swear.
 —J. A., in New York Sun.



GENERAL VIEW OF VALLEY LOOKING TOWARD THE TOWN OF BILLINGS, MONT.

THE IRRIGATION AGE.

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THE PROGRESS OF WESTERN AMERICA.

Prominent Men.

We are indebted to the New York *Journalist* for the picture we give this month of our well known contributor, Lodian Lodian, and the biographical sketch which accompanies it, is also taken from that paper. We are very grateful for the courtesy. We think that readers of the AGE will be interested in learning more of the prime movers in irrigation affairs and we shall endeavor to give from month to month portraits and sketches of those active in its interests.

Next month we hope to give portrait and sketch of one who may be termed the pioneer irrigationist of humid America—Dr. Clarke Gapen, of Madison, Wis. Dr. Gapen made such extensive irrigation experiments on the farm of the Kankakee insane asylum, during the time that he had charge of that institution, that he became famous as an authority on that subject. And there are many others whose portraits we hope to see in our pages later on.

All the Way From Texas.

We have always had a kindly feeling for the "Lone Star" state and this feeling was augmented when we received a crate of delicious Muscat grapes from Laredo, Texas. Mr. T. C. Nye, whose bright letters now and then have made him familiar to our readers, very kindly remembered us when his fruit was ripe and in consequence we had the pleasure of eating grapes at this season of the year.

Mr. Nye has demonstrated what profit there is in fruit and vegetable farming

and is a lesson to farmers to engage in this character of agriculture. His onions are a source of pride and profit, but he can best describe them, so we will say no more. Later we hope to be able to secure from Mr. Nye photographs of his place. At present we can thank him heartily for his kindness.

"The White Plague."

Through the various medical congresses and associations and the newspaper reports of their proceedings, the public is gaining a great deal of information concerning tuberculosis or what was formerly called consumption. Medical congresses were held recently in Berlin, Germany, in England and in this country at which some of the most eminent physicians discussed this disease which they claim is the most deadly scourge of this generation and suggested measures for checking the "white plague." It is only recently that the true cause and nature of this malady has been discovered by medical men and they are now anxious to so diffuse their knowledge among the common people as to enable them to use sanitary measures which will check the disease. It is caused, so it is claimed by a germ or bacillus, which may be acquired in any number of ways,—so many in fact—that kissing, eating, sleeping, and in short any mingling with your fellows is fraught with danger. It is regarded as contagious, inasmuch as by being with tuberculous patients you run the risk of inhaling the germs. Eminent authorities deny, however, that it is hereditary. The fact

that domestic animals are prone to tuberculosis and that they in turn infect humanity, has made the investigations of direct interest to dairy men, as milk is said to be one of the most common sources of infection. The dairymen of Illinois are vigorous in their denunciation of the investigations carried on by health officials among their cattle, some refusing to allow their cows to be examined.

Secretary Wilson was in Chicago a week or so ago and was interviewed on the subject of tuberculosis, with special reference to the effect had upon the dairy interests of the country. He was of the opinion that the wholesale slaughter of cattle on the supposition that they might be tuberculous was unnecessary and unjust to the owners of the herd. He mentioned, to sustain his belief, the experience of New York state, and said that while he thought it right and necessary to have a rigid and careful examination of the milk sold to the public and of the cows producing it, he thought there was no need to kill a man's cattle unless they were manifestly tuberculous. There should be common sense used in everything of this nature. Every now and then there is great agitation over some medical discovery or theory. Anti-vivisection societies were followed by the anti-vaccination movement and when there are no other germs to fear we in Chicago still have the lake water to dread and read ever and anon the warning "Boil the Water." If this great crusade against consumption does no more good other than doing away with the filthy practice of spitting—now so common—of wearing long dresses, and, best of all, if it succeeds in giving us purer, cleaner milk, it will be worthy of the effort being made.

The Trust Problem. One of the greatest economic problems of the day is that of the trust. Public opinion regards with alarm the increasing number and strength of these mighty combinations and means are being devised to legislate against them. To do away with trusts by law is as hard as it is to make prohibition effectual. You may succeed in making the laws, but the enforcing them is another matter. As long as poor human nature remains the same, some men will

have more of this world's goods than others, and if a law is passed against the accumulation of too much wealth, men will find some way to avoid it. According to a recent article, the trusts are the outgrowth of legislative measures against monopolies.

To avoid that law, men formed "trusts"—that is, their different branches of business were not sold outright to one concern, thus giving that a monopoly and making it come within the grasp of the law, but were given in "trust." An evil worse than the first. Now and then a writer speaks a good word for the trusts. He says that men receive better wages, work is more sure and the prices of commodities less than when buying of small dealers. Perhaps, if let alone, the trusts will eventually kill themselves. Senator Warren, of Wyoming, in a recent interview on trusts said:

"In the West the people are commencing to see that the trust business has been overplayed, it will cease to have its present terrors by the time the national conventions meet. What are the conditions, even today? Instead of new trusts being announced every day and stocks selling at fancy prices, we hear nothing more than the completion of some companies that had progressed so far that they cannot back out, and stock selling at lower prices. Trust certificates are not the investments they were a short time ago. The tendency toward combines and trusts stopped short because the buying public is no longer seeking industrial shares and stocks as permanent investments. It was a fad, and like all fads it has been overplayed, and the people who supported them are tired of them. When business is good, times prosperous, and money plenty there is much interest and more or less excitement. The short time in which this fancy of running to trusts existed shows the healthy condition of the public in regard to business. The question may be too far in the past to have any particular weight in the coming election."

The industrial commission created by the late Congress and appointed by President McKinley has been giving much attention to trusts, but it is not probable

that it will recommend legislation to the next Congress touching this question.

Commissioner John M. Farquhar, one of the men on the commission representing the labor interests said:

"If, instead of addressing memorials to Congress, people would build up a merchant marine by which the overproduction of America could be carried and sold to foreign countries there would be no cause for objecting to trusts in this country. In many cases the trusts have proved a benefit to the public at large. If the competition between rival corporations will lower prices the public is glad of it. There is one thing in the trust problem which should be remedied, and that is the enormous overcapitalization of corporations. It is responsible for more business depression in this country than anything else. The remedy for this lies with the state legislatures."

Irrigation in Turkey

We have been favored with a letter from E. Rahib Raif, of Aleppo, Turkey, who describes the progress of irrigation in that part of the world and tells of the contemplated improvements. The municipality of the city of Aleppo have decided at the instance of his Excellency Raif Pasha, Governor-General of the Vilayet of Aleppo, to place the old cumbersome system of modern water elevators or "norias" by galvanized steel ones of improved make. He has written to this country for prices and catalogues from the leading dealers in such machinery. This will not be a question of one or two water wheels, but of many hundred, perhaps thousands, as it is intended to use this system throughout the whole area of Northern Syria, along both banks of the Orontes, Tigris and Euphrates, far into the great Syrian desert. This, the writer says, "will confer great opportunities for cultivating and fertilizing those vast semi-arid regions which are at present neglected for want of proper irrigation." The motive power of the proposed water elevators will be the currents of the rivers themselves and the wheels must be, therefore, very accurately balanced, so as to revolve with the slightest flow of water. The irrigation

movement is being carried on with such activity, that where there are no running streams from which to take water by the above method, pumping windmills are to be erected, the mills to be bought in this country. Twenty mills have already been ordered from the Aermotor Co. of Chicago, and other large orders are expected to be placed in the near future. Manufacturers dealing in irrigating machinery of every description would do well to correspond.

It is interesting to hear of the strides made in the irrigation movement in distant countries, and we think that "it's a small world after all."

In Jamaica.

One of our subscribers in Jamaica writes us that there are now on foot two or three schemes for irrigation on a large scale on the island, and a gentleman from there is now on his way to California for the purpose of investigating the various methods of irrigating in use, with a view to adopting that most satisfactory.

From Ward County.

Two representatives of the "Grand Falls Irrigation & Improvement Company" situated in Ward county, Texas, made us a pleasant call this week and told of some of the advantages and improvements of their section of the country due to irrigation. Thanks to the *Grand Falls New Era* we have long been acquainted with the enterprise, and "up-to-dateness," if we may so coin a word, of that locality, but it was pleasant to meet the promoters of irrigation interests and hear of the inducements Ward county offers to homeseekers. We hope to give more than a brief mention of this favored locality next issue.

A Contrast.

A July issue without a mention of the "glorious Fourth" would be like "the play of Hamlet with Hamlet left out" to use a hackneyed expression, and would moreover show a lamentable lack of patriotism on our part. The contrast over last Fourth was great indeed and cannot better be shown than by quoting at length from the editorial appearing in the *Chicago Inter Ocean* the day after the Fourth.

"The Fourth of July had a wider celebration yesterday than ever before. A

year ago the display of the American flag in Cuba, Porto Rico, and the Philipines would have provoked a fusillade of hostile bullets. A man who unfurled the stars and stripes in Havana or Manila then would have been imprisoned or shot. But yesterday the American flag was displayed in all the cities of Porto Rico and Cuba, and in nearly all the commercial cities of the Philipines, as an emblem of peace. * * * * *

The celebration marked the extension of the field of rejoicing over what has been accomplished under the Declaration of Independence. No doubt there was as

much Americanism in the Porcupine ditriet in Alaska, in Honolulu, in San Juan, and in Havana, as in Boston or Chicago. There may have been less of certainty, but there was more of hope.

The people of the United States, with 122 Fourth of July celebrations behind them, must feel keen pride in the celebrations of yesterday among people new to their flag and in territory strange to their institutions. They must realize how, despite carpers and pessimists, the great cause of the republic still goes marching-on."

IT IS RAINING.

It is raining, raining peaches,
For the man who has the trees;
It is raining, raining honey,
For the man who keeps the bees.

And the oranges are coming,
In a heavy golden shower,
And the milk and cream are pouring.
This the children's happy dower.

Down they come, the corn and barley,
Royal wheat, of life the staff;
You would think 'twas raining money
By the way the people laugh,

It is raining, raining blessings,
Water pure and daily bread;
Glad the artizan shall labor,
And the hungry shall be fed.

—D. H. S. in *The Fruitman's Guide*.

INDIVIDUAL IRRIGATION ENTERPRISES.

JOEL SHOMAKER.

The modern farmer who has an individual irrigation plant is the most independent of all agriculturists in the arid west. He can apply the moisture to his crops when necessary, experiment with water duty and develop the science of irrigation to its proper position in the ranks of successful soil husbandry. The man with a ditch, well, spring or pump at his disposal need not fear drouths, as the rainfall is within his grasp. His seedtime and harvest come with perfect regularity and though his home be located amidst the deserts of desolation he may open the floodgates of the rivers of plant food and let in the sunshine of life to create an oasis of Eden, crowned with the bowers of paradise.

One of the most common methods of obtaining an individual water right is the tapping of natural rivers and streams, flowing from the mountains of perpetual snow. Here the irrigation farmer becomes the master of all conditions, by surveying and constructing the waterway leading to his point of distribution. It is a well known law of nature that water will find its level, and if properly handled will form the power necessary for carrying its volume through unnatural channels to the terminal depository. By giving it a fall of only one-sixteenth of an inch to the rod it follows a gravity canal and soon makes a natural course.

Many of the best farms of the western states are watered by the small ditches, taken from streams by the aid of dams of brush and stone, used to raise and divide the water. This system prevails particularly in the states of Montana, Idaho and Utah, but is more or less practiced in all small valleys. The ditches are constructed by running a plow two or more times along the proposed line and turning in the water which cuts its way. In most instances the gravity is so great that the ditches require but little attention in cleaning every spring. The original cost of such ditches varies from one dollar to one hundred dollars per acre under cultivation, and the maintenance expense is practically nothing.

A mountain spring when opened and kept clean is one of the best and least expensive sources of water supply for the individual owner. This may be had in almost any canyon, by digging a few feet in the line of a seap coming from a higher watershed. In many instances such springs can be opened by sinking wells in the beds of dry canyon streams, where the underflow is reached and the water brought to the

surface. The flow of a spring is often sufficient to carry in open ditches for miles, where one half will waste in seepage and evaporation, but the best and safest plan is to convey the water to the distributing point in wooden pipes or flumes. An ordinary V shaped trough will deliver an immense volume if given sufficient fall, and the saving made in one year, will repay the outlay for timber and nails.

In many sections of the west the streams run in deep banks, making independent gravity ditches an impossibility, by reason of the expense. This objection can frequently be overcome by sinking wells alongside the stream, and cutting under channels or tunnels from the low water mark to connect with the wells. Water can then be raised by windmill, horse, steam or gasolene power to the surface and distributed over the fields. Windmills may be made of common lumber, at very nominal cost, some farmers building them for \$5 each, and requiring but one to lift sufficient water for ten acres.

The underflow of streams is a very prolific source of supply for the independent owner of water. In some instances, particularly in Kansas and Colorado, the entire volume of a stream suddenly disappears from the surface, at certain seasons, and seeks underground channels, coming to the top again several miles below the point of disappearance. This water may be obtained by tunneling, on the gravity plan, to the bedrock which seldom goes more than ten feet in depth. In this way the streams are tapped and a portion of the flow diverted, the same as though the water was visible on the surface, the plan is not merely theoretical but is in practical operation at various places.

Artesian water supplies many thousand independent farmers in almost every irrigated state. The wells are more numerous in South Dakota, Utah and California, but are valuable sources of moisture wherever used. The expense of sinking such wells does not exceed one dollar per foot when all labor is employed, and of course is much less if the farmer does his own work. Water from such wells has a much higher temperature and can be put upon early gardens before the mountain streams are warm enough to assist in germinating seed. The artesian water in some places is used for keeping an even temperature in stables, barns and chicken-coops throughout the winter, and is a very valuable assistant in the kitchen.

In some of the districts favored by wind the homemade mills are often used advantageously by the individual farmer. Wells are sunk to tap the underflow of sheet water of a river bed or mountain current and by the aid of pumps the mills are made to lift water every day in the year. This may be stored in a reservoir and distributed over the fields as needed for irrigation. The reservoir can also be utilized for fish pond, boating place, watering pool for stock and other purposes

which the inventive farmer may discover. When surrounded by trees it makes a nice summer resort for the family and neighbors.

Sub-irrigation from adjoining streams or ditches is a favorite method adopted by some of the prosperous farmers in sections where such system is practicable. In the Grande Ronde valley of Oregon, all kinds of farm products, including sugar beets, are grown by sub-irrigation from the beds of streams. This system is possible along the lower river bottom where the streams are sluggish, and by arranging suitable dams or obstructions the under current may be increased and the farm be kept moist without any surface application of water. In other fields the water may be distributed over the surface of a higher tract and sub-irrigate a lower valley.

One of the best and safest individual irrigation works is the simple eastern reservoir, constructed either on the farm or in the mountains. This can be made for almost nothing but labor, which can be expended when the farmer has an idle time. If the reservoir is built upon the farm it may be filled from streams already appropriated, by using the surplus during high water, which occurs in the spring, or the ditch may be kept open throughout the winter and the water stored. This plan will be generally adopted by those desiring independent water supply in every irrigated district, and is one of the methods of solving the scarcity problem in dry valleys.



IRRIGATION INVESTIGATIONS IN KANSAS.

The following extracts are from the sixth biennial report of the commissioner of forestry and irrigation for the state of Kansas for the period ending June 30, 1898. The matter on irrigation is so practical and so applicable, not only to conditions in Kansas, but to almost any section where irrigation is practiced, that we regret lack of space forbids our quoting more extensively.

The investigations carried on have proved that where water is plenty, the gasoline engine is the cheapest power for lifting large quantities of water, but the windmill as a general rule, is likely to be most economical for ordinary pumping. The value of the windmill has led to the construction of many home made windmills, especially in the states of Kansas and Nebraska, many accounts of these ingenious devices having appeared in agricultural papers from time to time. The Jumbo is perhaps the most familiar—but more of that some other time.

The influence of a good example has caused one after another of Kansas farmers to follow the lead of his prosperous neighbor and resort to irrigation until now, in Western Kansas, it is practically universal. For the benefit of those who are contemplating irrigation for the first time, we quote the following regarding the location of the reservoir, etc.:

‘People are apt to say, ‘locate your reservoir on the highest part of the land you intend to irrigate,’ and this is correct; but before you do this, be sure that you are not making a mistake in the selection of the land to be irrigated. The first consideration is the water, and the mistake is sometimes made by rushing ahead before the water supply is made sure of. Sometimes we think we will get plenty of water in a certain place when there is not, although there seems to be plenty of water within a short distance. If it is a well that you expect to get your water from, be sure that it has been tested thoroughly before you spend any time or money on a reservoir. One other important consideration is the lay of the land; and it is so important that it should be taken into account before determining the location of the reservoir. Land that is almost level is by far the most desirable. You will not only get more benefit from the rainfall, but also receive less injury from heavy, dashing rains, and it can be said that nearly level land is a saving of time, labor, and water, besides the great saving from washing. It is not often that we will find ideal conditions ready-made. A fall of about one inch to 100 feet in the lateral ditch is plenty, while one and one-half feet to the mile will answer for a large ditch that is

straight. Having determined on the location of the reservoir, the next question to be determined is, what is the present grade of the location? If it is found that the grade is about right, then you are ready to decide on the shape and size of the reservoir; but if the reservoir site is found to be much higher than desired, calculations should be made to drop the bottom of the reservoir lower than the usual one foot; and if the site is lower than it should be, soil that is of a gumbo nature should be hauled in to raise it, and calculations made to take all the dirt for the banks from the outside.

SHAPE AND SIZE OF RESERVOIR.

The reservoir that will give the greatest storage capacity for the amount of embankment required is the circular, and for a small reservoir it is much more desirable than the rectangular. If it is thought best to have a large one, it should be made oblong without being rectangular. The corners not only cause more work in the construction, but the shape of the reservoir is objectionable, for the reason that the waves in such a reservoir have greater force. Irrigation with pumped water so far in this state has been principally confined to small operations; and on account of the evaporation being so much greater from a large surface than from a small one, and as the seepage, little or much, will increase with the dimensions, small reservoirs are usually preferred. A shallow reservoir, on account of the increased temperature of the water, will lose much more through evaporation. It is also claimed that warming the ground increases the seepage, and as warming the water, would to some extent warm the ground, the tendency of the shallow reservoir would be towards increasing the seepage, though it may be that the difference in the pressure would make up for the increased temperature. There will be very little seepage if the reservoir is properly constructed. Circular reservoirs from 30 to 60 feet across, and holding about six feet of water, would be good dimensions for ordinary use, and 60 by 80 or 100 feet would be good proportions for a larger one. The longer way should extend east and west on account of the prevailing winds. Of course, the deeper the water the less it will be affected by the wind.

BUILDING A RESERVOIR.

The first step, after removing any rubbish that may be in the way, is to lay off the ground large enough for the reservoir and one-half the banks. It has been found very difficult to prevent the seepage of water where the banks and bottom come together, and it is much better to make sure of it while there is a chance. If the grade will allow, it is better not to remove more than one foot of the top soil, except where it is found necessary to make the bottom level. Ten feet of the ground under the bank will require puddling with the

bottom, and the soil thrown out may be dumped close to the edge. After leveling the bottom it should be plowed, and the dirt thoroughly ground up by any tools that will do it most effectually. It should be then soaked thoroughly, allowed to settle for a day or two, or until it is safe to take horses or cattle in to puddle it. It should be worked down and packed so firm and smooth that a track would scarcely show. If the reservoir is very large, it may be found necessary to soak and puddle part of it and the next time it should hold well enough to give it a good soaking. If the ground is very open or porous, as it will be if sandy or gravelly, it will pay to draw in fire-clay or gumbo, which may be found in the bottom of some of the sags or buffalo wallows. After the start is made to puddle, it is best to stick to it closely until finished, if possible. As soon as the bottom is finished it should be given two or three inches of water to keep from drying out, and the filling in and puddling of the banks commenced.

The base of the dam or embankment should be nearly four times as wide as the embankment is high. A steady team will plow down a large part of the dirt required for the first and second packings. The first lot of dirt that is thrown in should not exceed ten inches, with the out edges slightly raised, so that a shallow trough will be formed around the entire pond. It will not be necessary to puddle the entire width of the embankment at the bottom except at the outlet. After the ten inches of dirt is puddled and packed, the outlet, which is usually made of plank, is placed in position, after the dirt is packed sufficiently to let it down so that it would lack about six inches of draining the reservoir. Much care will be required in packing the dirt about the outlet to prevent it from leaking. By taking two fence-posts that have been only haved, a very useful appliance can be made for packing the dirt in the embankment, or rather, in the trench. The trench can be made wide enough for two horses to walk abreast, and the two posts can be fitted together at one end so as to form a V-shaped drag, and if fastened together firmly with one bolt where the two ends come together, and a few pieces of plank spiked across the top, it can be weighted down so as to be made very effective, not only in the trench, but also in finishing the bottom of the reservoir.

A waste pipe should be provided, so that the water will not get a chance to run over the top of the bank, if neglected. The outlet flume should be so constructed that time will not be lost in operating it, or water lost through leakage. A wooden outlet may be constructed from 2x12-inch planks sixteen feet long. The gate should be made to fit tight, and be well cleated. One of the best methods of opening and closing is, to use a bench-screw attached to a long support, with the nut on the upright standard. One other method is very handy and simple, and is very easily constructed and operated, and if care is

used to prevent freezing, and the box is coated on the inside with coal-tar and rosin to prevent leakage and rot, it will give good satisfaction. The outer edge of the box should be sawed at an angle of forty-five degrees, and a door faced with leather should be hung at the top, using the same leather for the hinge. The next move is to get a blacksmith to make the arrangement for holding it in place, and to regulate the flow; and this can be done by taking a heavy strap of iron and bending it at such an angle as will allow of its being bolted on the outside of the box in such a way as to permit the raising of the door without interference. The strap of iron is intended as a support for a rod which is made to screw into a thread cut in the support, and can be made to pull the door open and push it shut. The rod should be heavy enough to stand a good strong twist, or a bench-screw can be used if desired."

THE GAIN OF WAR.

Can powder burnt be shot again,
 Or sunken ships reclaimed?
 Will battlefields give up their dead.
 Or War make whole its maimed?
 And what will quench the fire of hate?
 And what will salve the smart?
 And who will fill the larder up
 And bind the broken heart?
 Not cost of shell or prize of war
 Shall weigh the nation's cause,
 Nor count of men or smell of blood
 Shall give the nation pause;
 But what it loves and what it feels,
 The weight on heart and brain—
 To feed the starving, free the brave
 And rend the tyrant's chain—
 Shall nerve its arm and guide its aim
 And hold the balance true.
 And while a sacred emblem floats
 In Red and White and Blue
 To flaunt the sun and fringe the day
 And flame the very night,
 To show the world a hemisphere
 Where Might shall yield to Right.
 The nation strong, the nation bold—
 All passions swept away—
 Shall plant its flag on loftier heights
 And hold a nobler sway,
 Till earth shall see and feel the truth
 The raptured prophet saw,
 That Saxon Right by Saxon Might
 Shall hold the world in awe.
 The smoke of war shall incense be
 From Freedom's altars flamed.
 And battlefields shall bloom as May
 To deck the dead and maimed,
 And love will quench the fire of hate
 And peace will salve the smart,
 And God will fill the larder up
 And bind the broken heart.

—CLARENCE OUSLEY.

BOTH SIDES.—MORE ABOUT THE CELEBRATED DAM CASE.

Last month editorial mention was made of the decision reached by the Supreme Court regarding the International Dam Case—or, as it should have been—the Elephant Butte Dam case—the injunction prayed being to restrain the latter from being built, and we promised to give in this issue an article concerning the case by A. I. Barnes, of El Paso, Texas. Upon reading the above mentioned editorial, an advocate of the Elephant Butte Dam wrote to us, enclosing a clipping which practically contradicts Mr. Barnes' statements. The old saying goes that "One story's good till another is told." We intend giving our readers both stories, and publish therefore the short article by Mr. Barnes, followed by the clipping from the *El Paso Daily Herald*.—ED.

THE DECISION.

"When the Associated Press Dispatches announced to the world on the morning of the twenty-third of May that the judges of the Supreme Court at Washington had rendered their decision in the celebrated International Dam case, probably in no other city of the United States was there so much interest taken in the bit of news as here in the city of El Paso.

There was great rejoicing on the part of practically every one here because the decision had given our people the best assurance that the right was on their side in their claim that no person or persons should be allowed to take the water out of the Rio Grande to the detriment and damage of others having prior rights to that water.

The readers of the AGE are no doubt familiar with this matter of the International Dam, how an injunction was gotten out to prevent the construction of a proposed dam at a point farther up the Rio Grande, how the New Mexican courts decided against the injunction, and how it was taken to the Supreme Court at Washington for final decision. Both the United States and Mexican governments spent considerable money in determining the proper site for the proposed International Dam, and a treaty between the two governments had been drafted whereby the dam was to be built. At this stage of the proceedings an injunction was gotten out praying that the parties engaged in building the dam in the same river at a short distance above El Paso be enjoined to desist from completing their work, which of course delayed the signing of the treaty until such time as the injunction case could be heard and decided. The injunction has

been sustained and the case remanded back to the lower court with the instruction that an official investigation be made as to the points covered by the injunction. The decision therefore opens the way for the two governments to now take up the consideration of the pending treaty; and before very long it is to be hoped that this great question will be finally settled.

Advocates of the dam in the river above El Paso have claimed that the Rio Grande contained water sufficient for several reservoirs of the size proposed. Every reader of the AGE will remember that the last winter was a pretty severe one all over the United States. In fact, it was a record-breaker; and all will remember reading about the enormous snows in Colorado, when trains became snow-bound and



RIVER AFTER SPRING FLOODS.

were lost to the outside world for days at a time. The Rio Grande has its source in that same state of Colorado, and one would naturally suppose that this year above all others there would be an abundance of water in the river. Permit me to show you that this is not the case, as the two photographs speak for themselves. One of the photos shows the river at the time of the usual spring-flood; the other shows the condition of the river as it is today, (May 25th), with not a drop of water in it, and no water in any of the canals or ditches here. Does this look like there would be enough water for several reservoirs? Our annual spring-floods have come and gone this year, and the farmers in the valley, on both the American and Mexican sides, have had from one to two irrigations; and today, with no water

for their growing crops, their condition is pitiable. This year will certainly be long remembered in this Rio Grande valley as one of a great scarcity of water. Furthermore, such a condition as this may be expected every year until some arrangement can be made by which the flood waters of the Rio Grande may be stored in a reservoir for purposes of irrigation and in this way restore to Mexico and to this part of the United States the rights which have been denied them through their having been deprived of water for their crops and animals."

I. A. BARNES, El Paso, Texas, May 25, '99.

THE OTHER SIDE.

"Inasmuch as the result of the Elephant Butte dam decision as handed down by the Supreme Court as briefly mentioned in dispatches received here could not be clearly understood by the lay mind the *Herald* requested an expression of W. A. Hawkins, one of the attorneys representing the Elephant Butte dam company in reference to same and Mr. Hawkins stated as follows:

Until the text of the decision of the Supreme Court has been substantially known to me I of course cannot be certain of what the complete legal effect is. So far as indicated in the synopsis of dispatches and private telegrams received from our attorneys in Washington who argued the case before the Supreme Court the decisions of the courts of New Mexico are not however, reversed, but simply modified in one feature which would not now appear to be of any material importance and which modification should cut no figure with the building of the dam and the irrigation system connected therewith. The point which the dispatches indicates as being the only feature with reference to which the decisions of New Mexico are modified is this: It was claimed by the government that the construction of the dam and the storage of water thereby would substantially interfere with navigation of the Rio Grande river near the gulf. This was one of the contentions of the government only, there being a half dozen others. All of the other contentions, it would appear from these dispatches, have been either against the government or considered immaterial. With reference to this one contention the reported decision would make the supreme court say in effect that in event it is established, as a matter of fact, that if the plans of the company would when carried out substantially effect the navigation of the river as that navigation exists then to that extent the company must be enjoined and the lower court is directed to determine that one question of fact, and to enjoin the company therefrom. There is no injunction to be issued against the building of the dam or the irrigation system connected therewith, but the effect will be, if the synopsis of decision can be relied on, simply to prevent the company after it may have constructed works from holding or diverting such water of the river as would if allowed to flow on substantially—

contribute to aid irrigation. I therefore consider the decision of the Supreme Court as a substantial victory for our company as it will be impossible for the government to ever prove that the water to be utilized by this irrigation system would in any manner substantially aid navigation below here. In fact the navigation below here is farcical. A steamer makes occasional trips and only draws 28 inches of water for a short distance from the gulf, which waters are contributed to the Rio Grande by the Pecos, Concho, San Juan and other tributaries putting into the river hundreds of miles from here.

In the trial of the case in New Mexico there was also a precedence made as to proving the river navigable in the territory which theory



RIVER WHEN DRY.

was backed up solely by an affidavit of Brigadier General Miles that sometime in the long past he had floated a raft of cotton wood poles from Canutillo to El Paso, and someone else had floated some telegraph poles around a bend in the river during high water.

There seems to have been an impression prevalent in El Paso if the Elephant Butte Dam company could be prevented from building its dam the better show would be given the International, which I regard as a serious error. For enough water comes down during periods of flood to fill several reservoirs, such as the International and the Elephant Butte dam.

There is another feature to this matter and that is the Elephant Butte dam would be an actual existing thing at the present time and El Paso would have had a steady water supply if it had not been for this

suit which has been largely prolonged by the citizens of El Paso. I do not know whether the resources of the company have been impaired or not by the long wait pending the decision, but the telegrams from London still say go ahead with the work.

The International dam is simply a dream. Congress may or may not assist in its building, but from our general knowledge of such matters it may well be doubted whether anything material will ever come out of this effort. I think it altogether more probable that El Paso would be likely to meet with more assistance in the construction of this particular dam by the English company, that her citizens have been trying to destroy, than she will ever meet from the government of the United States, and I now believe it would be to the best interests of the city to unite with one accord in favoring the building of the Elephant Butte dam.

I have concluded to make the above statement with reference to the legal effect of the case simply because so many people have manifested a deep interest, by letter or personal inquiry. It is always objectionable for an attorney to undertake to outline the result until the text is before him. He may be mistaken and cause others to become so and renders himself liable to criticism, allowing his opinion to be colored by his hopes in reference to his client's interests. But the above is the best light I can give on the subject and my opinion may be changed at seeing the full text of the decision. At present, however, it would appear reasonably certain that the above is correct."—*El Paso Daily Herald*.



THE CAREER OF A TRAVELING TECHNICAL CORRESPONDENT.

"Lodian the Irrepressible."—*Locomotive Engineering*, N. Y. July, 1896.

It was in November, 1897, that the use of the words above quoted was first discovered by Lodian, when looking through back numbers of *Locomotive Engineering* in the library of the Teknicheski Cociété (Technical Society) at Peterburg, Russia. When the words appeared (July, 1896,) he was among the wilds of the borders of Manchuria and extreme eastern Cibiria ("Siberia").

Although never professing journalism as a means of existence—and an almost unknown personality among press writers—still, Lodian has contributed so profusely to technical periodical literature on technics foreign during the past two decades, as to perhaps warrant these notes on—as some may think—a unique career of travel. They will afford an insight into the life of a traveling technical correspondent who, apart from his regular work as an inspection engineer, employs his spare time lining for engineering and mechanical journals.

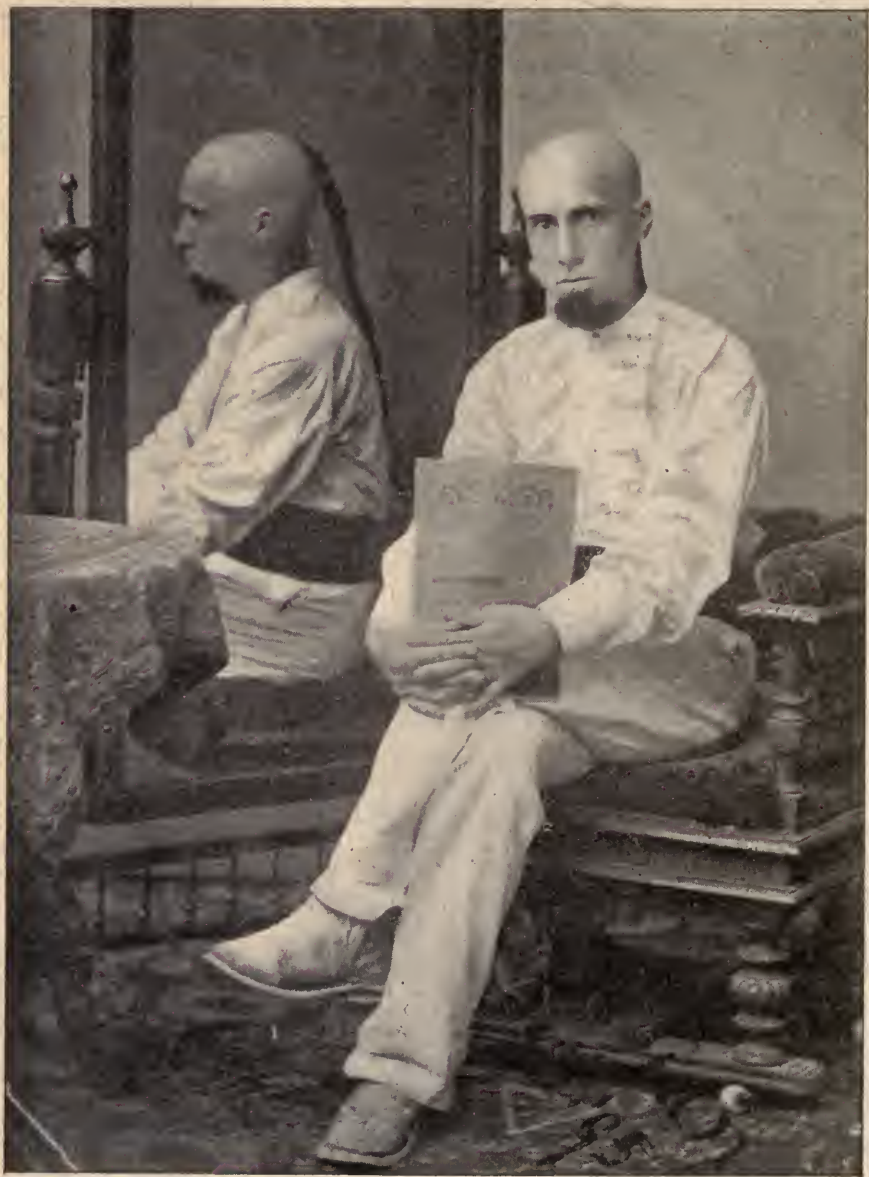
When he made his first call in November, 1888, at *The Journalist* office at its old abode on Nassau street, it was on the occasion of his return from his first tour, he made us a second call in 1893, after circling round again, en route to the Pacific; and, rather curious to relate, both Forman and Lodian were traveling in India in the same year of 1895, crossing each other's lines, yet never meeting or hearing till recently of one another's presence in the far east.

Lodian (Mex. Lodia) is not a Russian, as is usually thought—although it is true that he is familiar with that language—but a regu-down-east yank—a New-Englander—with San Francisco as his home.

Brought up—or rather bringing himself up—as an engineer, Lodian's first trip abroad was to Latin America, early in 1885, to the old Peru viceroyalty. He thought—like many other deluded ones have thought—he was at once among "gold-mines," but soon got sadder and wiser.

The mining properties being paralyzed by the insurrection, Lodian joined the disorganized command of Kaceres as a means of getting out of the country, and from a *teniente-comandante* was "jumped" (hazards of war) to the post of *teniente-general* (lieutenant-general), and in this capacity continued with Kaceres (or Caceres)—the 'scarred Kaceres'—at the assault and taking of Lima (December 1, 1885).

Proceeding to Chile, he crossed the Nevadas of the Andes, in April 1876, to Argentina, and spent two years in the Plata state engaged on mining and railroad work.



Courtesy A. Foreman (*the Journalist*), New York.]

L. LODIAN, c. e., in Tibetan-Himalayan costume.

(print by F. Nap, Eurasion, Humayon, Koberalarta, Indasia)

Leaving Buenos-Aires by the Spanish mail in April, 1888—"glad to clear out of the fraudulent country"—he returned, after protracted touring in southwestern Europe, to the United States in November of the same year.

After a few month's preparation, he returned to Europe in April, 1889, charged with making secret reports on engineering properties in different continental countries; made the double-circuit of Europe; scaled, alone, the snowed-up sierras of the fastnesses of the Pyrenees by the pass el portus (Sunday, April 26, 1891, and following three days), and descended into the ancient little Republic of Andorra, being the only American to visit this political, democratic curiosity since Bayard Taylor; revisited Espana and the Latin-European states for the third time; was detained by much litigation in the land of the Cid (May-October); revisited Monte-Carlo for five months (November-April) trying to recuperate; took a long rest among the Swiss and Italian lakes; and returned home February, 1893.

Eighteen months of travel followed reporting for foreign syndicates on United States, Mexican, and Canadian properties, then Lodian returned west for a few weeks rest.

Leaving the Pacific coast August, 1894, he ran through the chief Polynesian islands; traveled seven months in Australia (October-May); then made a direct cut north again, via the great barrier reef, (pilotage 1,200 miles, the lowest ocean pilotage extant) and New Guinea to Northern Hindustan.

In September, 1895, he was engaged by the mandarin Wu, of Tibet, (then in Bengal) to proceed to that country, and report on a project for the sanitary canalization of the capital Lasa; crossed the Himalayas with the mandarin's entourage; and reached Lasa without incident the 29th of September.

It is at this juncture we advert to the photo of Lodian in semi-mandarin costume. The kue (Tibetan, koza) was all composed of his own hair, which, after being shaved off, with the exception of a small tuft left on the top of the head, was perfectly made up—the remnants being about three inches long—into a slim kue about two feet long, and, with the aid of a few strings of silk, was "dissimulated" into the tuft left on the head. This tuft, or remnant, itself formed, when the made-up kue was off, a comical little pigtail.

A copy of a New York technical monthly, *The American Engineer*, is held in the hand; but Lodian was never connected with the journal. Probably that publication, and *Locomotive Engineering*, are the only two American technical journals to have ever seen the light of Lasa.

Questioned on returning to Europe, at his permanent residence on the avenue de l'opéra, Paris, concerning a book called "Forbidden Fruit" (or something like that) by one Landor, who tried to get near Tibet, Lodian replied he had never read it but had read extracts therefrom, and thought the book (judging from the excerpts) must be

the "acme of 'oskawild' exaggeration and sensationalism run mad."

"It is patent on the face of it. But, there—Landor has only been doing in book form what the average newspaper sensation-monger does daily in newspaper form. It is none of my business. It is the stuff that pays, though. Were I to write the record of my own Asiatic travels, there would not be a single sensationalism in the book. So it would not pay."

The original idea was to proceed overland from Lasa to Peking and Japan; but, in Indasia, "man proposes and fever disposes." A reducing-sapping type of remittent set in after prolonged divings into the poorest and most unsanitary quarters of Lasa, in connection with the sanitation thereof; and after only three weeks in this theocracy, a retreat south was made back again over the Himalayas to the Ganges; thence to Ceylon for six weeks convalescence, sea bathing—the remedy sought.

Quitting Ceylon by the Russian liner "Tamboff" on January 6 1896, Japan was reached (via Singapore and Formosa) three weeks later, and a couple of months spent touring therein.

Proceeding to Korea, various surveys were effected along the east coast and a landing made at Gensau, with the idea of proceeding overland to the Russian frontier north, but the Japanese steamer luckily continuing on to Vladivostok, that port in extreme eastern Cibiria was reached 1 (13) April, and a landing effected amid the worst snowstorm—lasting all day—Lodian saw during his subsequent nearly two years' journeyings across the Russian union. A typical Cibirian reception!

And—official warning boards in four languages notwithstanding—within two hours of landing he was up among the slippery mounts and fortresses overlooking the harbor.. The very furiosity of the unabating whirlwinds of snow was a sort of factor of safety. Off guard!

After a fortnight's preparations for the long overland trans-Asiatic journey to the Ural mountains, and Europe, Lodian quitted Vladivostok 18 (30) April, and Xabapobek 3 (15) June; ascended the Amur to its head waters; crossed the Iabloni mountains afoot; then always alone, the Altai spur-ranges, circumventing the southern end of the great Baikal, examining throughout the strategic features of the trans-Cibirian railroad, and reached Ipkytk (Irkutsk) the 20th of August. This concluded the first surveying detail.

Using Ipkytk as a base of operations for a couple of months, he reconnoitered the country north and south; and 16 (28) October, commenced the second section of the surveys over the snow-ice to the Ural range. It is probably the first through-winter survey on a 3,000-mile scale of magnitude evermade in the history of surveying or engineering inspection; but Lodian accomplished it all, and was only once (nearly) lost in the great Cibirian forests. On one occasion he experienced 52 degrees below zero centigrado (equaling, say, 65 below

Fahr.) Time: six months. He gained, after diverging half way via Tomck, the central Ural range (Cipoctah, pronounced Cirostan) 18 (30) April, 1897—singularly enough, occupying just one year to the day, for the trans-Cibirian railroad inspection from the Pacific ocean to the historic monument in the Urals on one side of which is inscribed *Acia* (Asia) and on the other side *Ebpona* (Europa). And, seated at the base thereof, Lodian ate his last "survey breakfast" in Asia.

This trans-Asiatic inspection was a unique one, effected without a single mishap, or any molestation from the Asiatic tribes passed through, and with every consistent courtesy from the military authorities—perhaps prompted by the official letter from the state department at Washington, issued to Lodian in the summer of 1894. And more—he went through various of the prisons and *étaps* without any authorization or arrangement whatever, but as the result of friendly camaraderie with the officials, and was surprised at the scrupulous cleanliness thereof, and the fair lot of the inmates. The labors of George Kennan and the *Century* have not been in vain!

A year's surveying and inspecting in Russia followed; the Tolstoi-Lodian meeting occurred 12–15, (24–27) September; the friendly Hilkof-Lodian brief—too brief—visits occurred in Petersburg at the ministry on the Fontanka kanal in November—after which the surveys were continued south through Russia to Warszawa and the extreme western frontier of old Polska, being finally concluded at the town of Poznan, March 1, 1898.

Thus ended Lodian's travels among the most hospitable people on God's earth—the Slav race.

Between the Pacific ocean and this western frontier of Polska (Poland), over 12,000 verstras (8,000 miles) of surveying had been accomplished afoot, through two summers and two winters. Total time, 676 days.

After such a task, nature demanded some repose, and Lodian had it in quietly touring about western Europe until his return to America, 21st of January last.

Lodian is now preparing for his fourth journey, which is to surpass all previous ones. In the fall, he returns to Europe, and will interest a syndicate in the project to connect the trans-Cibirian and trans-Canadian railroad systems (from Ipkytek, or Irkutsk, to Winnipeg) by a trans-arctic midwinter route over the ice-wastes. The drawing out of the necessary firmans and protocols will cover a year, and in the fall of 1900 the surveying commission travels via the Urals, the Lena river, Iaktyek and the mouths of the Lena on the trans-arctic survey to north Greenland and Hudson bay.

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs. Also sketches or plans of convenient and commodious barns, hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us improve the appearance of THE AGE?

PROFIT IN POTATOES

The potato is a most valuable farm crop, adapted to nearly all classes of soils, and with careful cultivation and proper fertilization yields from 500 to 1,200 bushels per year. A rich sandy loam, containing leaf mould, or natural mountain surface soil, is preferable for growing choice tubers, but any well drained tract, having proper plant food, will produce satisfactory crops. May and June are good months for late planting, and the present market demands the Burbank as the ideal table potato. If the land is irrigated about the middle of May, then well plowed, harrowed and leveled it will be in good condition for planting the first of June. The most successful potato growers cut the seed in four pieces, using 12 to 15 bushels for an acre, furrow out the land with a shovel plow, drop the seed about 12 inches apart, one in a hill, and cover to the depth of 4 or 5 inches.

Potatoes should not be irrigated more than once before the blossoms appear, after which the hills should be kept moist until the tubers are ripe. Too much water will cause scabby half grown tubers, and if kept up late in the fall will produce a second growth, making the entire crop unmarketable. If the seed shows signs of scab it can be soaked in a solution of corrosive sublimate, mixed at the rate of 2 ounces to 18 gallons of water. When the plants begin to show above the ground the field should be thoroughly harrowed.

After harrowing cultivation should be given by plow, until the blossom buds appear, when irrigation will complete the work. The furrow system is probably the best and most generally practiced method of irrigation and flat cultivation gives better results than the old ridging process. Water must not be left to stand upon the field or run around the vines on the surface.

Harvesting may be profitably done by the use of the four tined fork, if the acreage is not too large. Some potato growers use small plows or hoes successfully, though first class diggers are the best, if several acres are to be harvested. The tubers must be handled carefully to prevent bruising or peeling, and should not be left out long enough to sun burn or freeze. A cool, dark cellar or root house is the best place for storing potatoes, and an even temperature is necessary to good keeping. Sorting should be done at leisure after the potatoes have been stored, and none but first class specimens be kept for market or home use. It is not advisable to retain any seed for next year's planting, as the annual change of seed and land is necessary for good crops and a healthy growth. Seed potatoes, like all other garden and farm seeds, should be purchased new every year, from reliable seedsmen.

Potatoes require liberal fertilizing every year to be productive and profitable. All experiments in potato growing show that the fertilizer used must contain a

high percentage of potash. Barnyard manure will increase the yield, if properly rotted before applied, but the best results are obtained from planting land on which manure has been spread and a clean cultivated crop grown the previous year. Commercial fertilizers may be used with profit by placing in the furrow containing the seed bed, thereby giving the plants immediate benefit of the food. If a fertilizer carrying considerable potash is liberally deposited in the rows, and covered at once to prevent leaching, the moisture from proper irrigation enables the plant roots to take up and utilize all the food elements. This should be done early in the plant growing season in order that a thrifty growth may be attained, and the vines be more able to baffle the ravages of insects and resist drouth.

Market potatoes must be well packed in centals or gunny sacks, for the purpose, well sewed and so tight that they will not shake and bruise. Such sacks have sold for \$40.00 per ton during the present season, in the Pacific Coast markets, and the supply has not been equal to the demand. There is no indication of any decrease in the demand, but the rapidly increasing population and ever expanding markets of the Orient and Alaska make the outlook very bright for potato growers. The market for desiccated potatoes is steadily growing and new factories will be erected to supply the far away users of potatoes. The unsalable tubers are good for stock food, when mixed with grain ration, and there is no question about a future field of profits.

JOEL SHOMAKER.

AN ONION PATCH.

In a recent letter from Mr. Nye, of Laredo, Texas, we are given some interesting information concerning his onion crop. Mr. Nye has long promised us an article about his "garden" but has been waiting in the hope of inducing a photographer to take some views with which to illustrate it. He has found so much difficulty in this latter attempt that he has been forced to give it up and so writes a very interesting letter, so interesting, in fact that we quote it that our readers may enjoy it too:

"I will give you an account of an Onion

Patch that I have grown this year, and right here a thought strikes me that if 100 men, old Hayseeds, were to read this statement 99 out of the 100 would not believe a word of it and still it is true every word of it and while it may look a little extravagant, I expect with the help of some fertilizer to do better next season.

To begin with I plant Bermuda onions and the seeds are grown in the Island of Tenneriffe, one of the Canary group. The seed house that imports them is generally able to send them out to their customers so as to arrive 1st. of October. Last fall they failed to arrive until October 15th. They generally cost about three dollars per pound. I planted 25 lbs. of seed on four and one tenth acres and I raised or I sold, rather, 64,000 lbs. for \$883.00, besides I got 25 bushels of onion setts, which should be worth say five dollars per bushel, 125 dollars, making in all \$1,008.00. Now I would not sell these setts for any reasonable price for I have them here and can plant them whenever I please in September and as they mature earlier than those do from the seed planted October 1st. And March and April onions are what count for price. Now comes the cost. Seed 25 lbs. \$72.50, planting and thinning \$100.00, cultivating \$35.00, with three Planet Jr. Double Wheel Hoes, watering 100 hours 44,000 gallons per hour, \$100.00, sacks and labor gathering crop and shipping \$100.00, total cost production, \$407.50. If this crop had matured in April instead of May they would have brought from a quarter to a half a cent more, but I am well satisfied with the result and expect to try and do still better another season and with the setts that I have on hand for a good early start, there is no good reason why I should not improve on this crop. Of course I expect to plant a lot more seed in October. I will need more setts next year. We are now in the midst of our grape shipments, onions and Muscat grapes two extremes, I sent out over the state this morning 65 crates of twenty pounds net grapes to the crate, but I hardly ever realize anything on those that go out of the state. So a burned child dreads the fire. Whether it is the fault of the grapes not arriving in any shape, or dishonest car men I am unable to say, but last year I sent a box to Colorado

Springs, Col., also one to a friend in Toronto, Canada, and two to Harrisburg, Pa. all arriving in good shape, but when I sent a shipment to Denver, Kansas City, St. Jo, Mo., and Chicago, the commission houses reported them as arriving in very bad condition and unsalable. It does seem as though any one of the cities named above could use the entire product of these forty acres of Muscats grown here and when we know there is no opposition from any quarter. It may be that the people are paupers in these cities, still I have heard there are a great many rich people in the north and it must be that they, the people, are too stingy to buy grapes, but I don't believe that either. When I ask who owns the Rail Road, the Western Union Telegraph Stock, the Pullman Sleepers, the Telephone, the Standard Oil, and every other blood-sucking concern, the answer comes, why the north and eastern people to be sure I think the Commission Houses North think we people are legitimate prey. I remember once in a city asking how do all these people make their living. Why the answer came pat "out of suckers to be sure," and the W. U. Telegraph beat the tax and threw it upon the dear people, but let me give you a sample. Last winter I wanted to send a message to Morterey, so down I went to the Telegraph office and found it closed, the day being Sunday, but out on the street I met one of the operators who told me that if I would cross the river into New Truedo, Mexico, that I could send the dispatch for 40 cents Mexican money but that, on this side I would have to pay the W. U. 70 cents American. Now the 40 cents Mexican is only worth 20 cents of our money, but the Mexican Government owns and operates the Telegraph there and on this side the W. U. operates the system. The Lord deliver us from our friends should be our prayer. Still I dare not trust our grapes across the state line. I feel that I would loose the whole outfit.

With kind regards I remain yours truly.

T. C. NYE.

CULTIVATION OF STRAWBERRIES.

Strawberry growing is a pleasant and profitable industry, suited to the modern methods of intensive soil culture. Some

experienced market gardeners get 1,000 bu. from an acre, netting from \$500 to \$1,000 a year. The plants are easily grown and require less care than other farm crops, producing one tenth the income. The berries are healthful home necessities, appreciated by the entire family, and no farm is complete without a strawberry bed. There are many good varieties, early medium and late. A discription of each may be found in nursery catalogues which may be had for the asking. Among those generally grown are the Wilson, James Vick, Captain Jack, Gregg, Manchester, Magoon and many more, varying with the market demands and fancies of individuals.

A deep, well drained soil containing moisture holding qualities is preferable for strawberries, as the plants demand considerable water coming from the sub-surface. The matted row or raised bed system of planting usually gives the best satisfaction where the beds are irrigated by running water through the trenches, and left to stand several hours to thoroughly soak from below the roots. If planted on a slope, or over a gravelly under surface the drainage carries away the surplus water, preventing the soil from getting loggy or foul from stagnant pools. As the land must be clean of weeds it is advisable to use some commercial fertilizers rather than too much barnyard manure.

In planting by the ridge method the land is laid out in beds about thirty inches between furrows, leaving the ditches six inches deep, and running with the greatest slope of the field. Two rows of plants are set on each bed, standing fifteen inches apart, leaving the irrigating ditches on either side. These trenches act as waterways for carrying off the surplus rainfall and for irrigating in the arid sections. The plants may be set in the fall, August being a very good time, or any of the spring months will prove satisfactory transplanting seasons. After setting they must be kept moist for several days to insure thorough rooting. Top dressings of fertilizers containing phosphoric acid, potash and nitrogen should be applied very liberally.

Strawberry plants are male and female, and the grower must understand this

peculiarly before putting out a bed. The nursery men catalogue those having perfect and imperfect flowers and will give explicit information if requested. If one row of imperfect plants has two or three perfect flowering kinds on either side it will bear profusely. The vines must be planted so that the roots extend out as far as possible, with no curling or doubling to get them in small holes. After they have started to run the shoots should be cut back to the original plant. Winter mulching is profitable in every climate, as it supplies fertility and protects the plants from sudden winter changes. Forest leaves make the ideal covering as they have no noxious weed seeds in them.

The picking, packing and marketing of strawberries are important points in the culture of this fruit. If the land has been leveled and put in good condition before the vines were planted, and the water has been distributed properly, there is no trouble experienced in the picking. The pickers walk in the trenches and reach across the matted rows, getting all ripe berries. These are then taken to the packing boxes, put in the small cups in

such a way as to show the neatest and most enticing specimens, and crated for the market. Some shippers use the sixteen cup crate and pronounce it the best, others ship in boxes or baskets. The market demands must always be filled regardless of all other plans, and the fruit must be honestly packed.

Strawberry beds are not permanent money producers. Two years is long enough for the same area to be in one kind of plants. The rule of farm rotation applies with particular force in this as well as many other plants. It is a good idea to plow up the beds every second year, putting new ones each spring or fall, thereby insuring perfect harvests every year. If the strawberry bed is plowed immediately after the fruit is picked the ground may be profitably utilized in planting late cabbage, cauliflower, potatoes, turnips or sown to fall grain. After taking an early hoed crop from land, plow it thoroughly, put in good condition, apply about 100 pounds of potash per acre and plant in August, and the vines will bear a fair crop next season.

JOEL SHOMAKER.



PULSE OF THE IRRIGATION INDUSTRY.

STATE RESERVOIRS

From the Redlands (Cal.) Citrography we learn of a plan for a great irrigation movement in California. The promoters of the enterprise are leading men of San Francisco and it is proposed to secure the co-operation of the large commercial bodies of San Francisco and other cities in the state with the great end in view of building reservoirs to store water for irrigating purposes in time of drouth. The loss occasioned by the extreme dry season of 1898 impressed the people with the necessity of providing water for similar periods. The originators of the plan have addressed a letter to the commercial bodies, whose purport is as follows:—

“Gentlemen: The drouth of 1898 cost the State of California over \$40,000,000. For twenty-five years we have applied to the National Legislature without relief. It refuses to regard the question as a national one. No interstate questions are involved in the sources of water supply of our State, as such sources are almost all within our geographical boundaries. There is, therefore, no reason why we should expect aid from the National Government, except possibly in assisting to regulate the flow of the few streams in the State which are called navigable and which would come strictly within the purposes and spirit of the river and harbor bill. Of late years the attention of the National Legislature has been turned toward the irrigation by storage reservoirs of lands still owned by the United States. We have no such lands of any appreciable amount in this State, therefore our chances of relief from this quarter are less, in our opinion, than they were years ago. If we wait for it we will be dead before it comes.

Private capital will not invest in storage reservoirs, as the return must be small or the public oppressed. The Wright Irrigation Act has been a practical failure.

Moreover, the contról exercised by the Boards of Supervisors over such investments frightens private capital.

With State control over its winter flood water California is capable of supporting 10,000,000 people or more. The possibility of drouth and uncertainty of crops deters home seekers from coming here. The State should step in at once. Its powers are ample. It alone possesses adequate powers. There is no reason why California should not do what France, Egypt, Lombardy and India have already done and done successfully.

We believe that the State has the remedy in its own hands and that it must now take up the question of the storage of flood waters as the only means of its future salvation.

In our opinion San Francisco should take the initiative in putting such a plan into practical operation. It should convince the people resident in the country that it recognizes the fact that its very existence depends upon the success of the country, and that it is willing, even eager, to assume its proportion of a temporary burden which will result in a direct benefit to the State at large.

When, early this year, another dry season seemed imminent we devoted serious consideration to this matter. Several informal conferences were held.

Data was also collected convincing us that it would only require a beginning of disinterested, sincere and earnest men to inaugurate a movement that would start a gigantic, but perfectly feasible, plan to a successful termination.

All the plan needs behind it is influence, energy, patriotism and removal from jobbery and theft. The movement must be non-partisan and with such force behind it as to prevent it from falling into the hands of politicians. The undertaking is gigantic, but practical and feasible

And for this purpose we propose to call a convention at an early date in San Francisco, the delegates to be selected as representative men from the cities and towns of the State, and invite you to join officially in the call for such convention. The object of such convention will be to adopt a definite, practical plan by which the State may impound its flood waters and distribute them during the seasons of low water at reasonable rates."

No practical plan has been definitely decided upon as to the methods by which this great end may be attained but it will probably be matured soon. This is a worthy and practical movement and one which we hope will succeed.

SMALL FARMING A REFUGE FROM POVERTY.

John Habbertin has this to say about small farming as a refuge from poverty:—

"While we Americans are valiantly endeavoring to out trade and out manufacture all the other nations of the earth, there is danger that we are losing proficiency in the most important of the arts which is that of extracting subsistence from the soil. We shall never lack farmers who will sow, reap and graze, and thus produce grain and meat for those who can buy, but their methods differ entirely from those of the men who in spare hours get partial or entire livelihood from the bits of ground about their homes.

In earlier days almost all Americans, the mechanic the shopkeeper and the professional man alike, regarded the home garden as part of their business capital and as assurance against starvation in times of business depression and enforced idleness. Excuses were sometimes made for the blacksmith who forged a clumsy plowshare or the minister who preached a poor sermon, for not every man can be perfect at his own trade, but every man was expected to know how to dig, plant and cultivate an acre or two of ground, and to 'raise' enough on his place to keep the wolf from the door until times became better. The yield of single acres of hand-tilled ground in the earlier days was often enormous, and was the precursor of the high farming of the modern market-gardener, who often clears as much profit

from a single acre as the Western farmer gets from forty times as much land.

The fifteen million Americans who live in cities of more than thirty thousand inhabitants and in houses owned by other men cannot be expected to find tillable land about their homes, but neglect of the soil and its possibilities is noticeable in thousands of villages and manufacturing towns. At any lounging-place may be found idlers who complain that there is no land left for the poor man; meanwhile the ground about the complainers' own homes goes untilled. This is not for lack of suggestion, for occasional German, Swede or other immigrant from Europe will be planting for several successive crops near the grumbler, and will have a surplus to sell.

Not all Americans who are not farmers can expect to live by manufacture and trade, for we are already prepared to make and sell about twice as much as our own people can buy. We shall get our full share of foreign trade, but the purchasing power of the foreigner is not unlimited, and we are not the only people who have designs upon his pocket. Sooner or later many of the half-starved, half-imprisoned people of the large cities will be obliged to go back to the soil for their living. There will be no lack of soil, for outside the limits of the cities there are only twenty Americans to the square mile of territory, or one to about thirty acres, and although perhaps a quarter of the acres are too bad to till, the remainder could busy ten times as many people as there now are in the United States. In older lands than ours, where men have learned to work the soil for all it is worth, an acre of ground yields support for one person for a year. It does not provide silk dresses, opera boxes and the best cigars, but the same may be said of millions of industrious efforts in the trades and professions.

In a land where every one is urged to scramble for the top there should be some safe dropping-place for the millions who tumble outward and downward in the struggle. The only possible one, except the poorhouse, is the soil: this, if treated with a fraction of the energy and intelligence we Americans dissipate royally on

anything that promises a fortune, will save countless families from the fear that leads through despair to destruction.

—*Saturday Evening Post.*

FROM PECOS VALLEY, N. M.

Carlsbad, Eddy P. O., N. M. June 15, '99.

Dry weather may not apparently effect a district where a system of irrigation is established, and crops may appear to thrive well enough but a good shower of rain now and then helps matters wonderfully. Eddy, or rather Carlsbad as it is now called has, for some weeks past, been undergoing a dry spell and while the farmers suffered no loss, sheepmen did, and the cattle men began to look serious also. Within the past few days, however, the Heavens opened and in various parts of the valley heavy showers have fallen, causing a rise in the Pecos river of over five feet in one night, a rise which placed four feet of water in one of the reservoirs of the company known as Lake McMillan and three feet in the other. As these two lakes cover an area of some 10,000 acres it can readily be seen that an immense amount of water must have fallen in the upper part of the valley in a short space of time.

It has been found that while the sugar beet yield is fully up to the average in quantity when cultivated with the assistance of irrigation alone, when there is even a modest rainfall the percentage of saccharine matter contained in the beets is largely increased and its purity as well.

With the aid of the irrigation ditch there now appears to be no reason why the cultivation of celery should not in time become one of the foremost industries in the valley, especially in the vicinity of Carlsbad where the soil appears to be peculiarly adapted to its growth. On twenty-five acres last year a man near here cleared \$5,000 and possibly there will be several similar instances this present season.

The fruit now ripening in the orchards of the valley, the result entirely of irrigation, possesses a peculiarly sweet and delicious flavor. It is not as full of juice as the California fruit, but it equals it both in size and in flavor.

ARGUS.

GAINS BY IRRIGATION.

Irrigation is making great advancement in the interior of Nebraska. All the western part of the state is now under irrigation and the crop prospects of that section are equal to those of the banner section of Nebraska—the eastern counties. Fifty bushels of corn to the acre is the estimated yield of the whole irrigated district, while the wheat will be as good as that product in any part of the state. The farmers find that after paying the additional expense of irrigating they still have considerable excess of revenue over those farms better located, where irrigation is not felt to be necessary. A. M. Allen, a capitalist, who resides in Minneapolis, Minn., has enormous irrigated interests at Gothenberg, Neb., the very heart of the irrigated district of the state. Mr. Allen spends several months in the year at Gothenberg. He has just returned from an inspection of the irrigation ditches of that part of the state. In discussing the situation there are at present, Mr. Allen says:

"Irrigation is an interesting problem and cannot be better illustrated than telling of what has been realized out in Nebraska around Gothenberg. One man had a field of winter wheat, and in order to determine accurately what results were obtainable from irrigation we sent an engineer out to his place to measure off and mark a square acre. We made no special effort to select any grain that was better in appearance than the general run of the field, but took an acre just as it came. This plot was carefully marked, cut, thrashed, and separated and yielded sixty-five bushels to the acre. Another man gathered 2,800 bushels of corn from thirty-five acres of irrigated ground, and one small patch of five acres produced 525 bushels. The first was an average of eighty bushels to the acre, the latter 105 bushels. It is customary to cut irrigation alfalfa four times, and the average crop is about two tons to the acre. These figures are about 40 per cent. better than farmers can do without irrigation on the best lands in Nebraska. As a matter of fact, irrigation brings farming to an almost exact science and makes it as certain and reliable as banking. It is possible to

estimate almost exactly what the results will be. The farmer is released from all the anxiety contingent upon climatic and other accidents.

"I believe the time is near when irrigation will be introduced into Eastern Nebraska. Even where the rainfall is practically certain, irrigation makes the yield more certain, and from 15 to 50 per cent. larger. I find a good deal more alfalfa this year than last through Nebraska. Many of the fields in which the winter wheat was destroyed have been put in alfalfa, especially in the valleys. Farmers through Nebraska are paying a good deal more attention to haying generally this year than ever before. They realize that they have not been getting as much out of this phase of farming as they might. This year they are putting a finer quality of hay on the market than in the past. They are paying more attention to the 'first cut,' something they have practically ignored in the past. Why, the South Omaha stock yards are today, and have been for years, buying practically all their hay from Kansas farmers, when they would really prefer to purchase it in Nebraska, for obvious and economic reasons.

"The company has been forced to this, because the Nebraska farmer in the past has failed to prepare the quality of hay the yards find it necessary to feed. The management uses a fine quality which Kansas farmers produce by cutting their hay early, making two cuts of the crop. The first cut is short, tender and juicy. It takes a good deal of it to make a ton, but it brings 15 per cent. better money than the Nebraska farmers can hope to get for their heavy grass, which they will not cut until it is long and heavy and weighs many more tons to the acre than the short stuff. Of course, there is more work attached to utilizing the first cut of short grass, but it pays well. The Nebraska farmer could easily sell the South Omaha stock yards every pound of grass they use if they would cultivate the short light cut, better known as No. 1 upland. The Nebraska farmers are being educated to this sort of thing this year, and the indications are that in a short time the thousands of tons of hay being

shipped from Kansas into Nebraska will be forced out of the home market by the Nebraska hay. The stock yards people have tried to tell the Nebraska farmers something about this subject in the past, but they do not seem to have grasped the situation. If they do cultivate this light short, cut grass crop it will mean the distribution of thousands of dollars in the state which is annually sent out of the state for the hay now. Ordinarily, the Nebraska farmer lets his hay alone until it becomes very heavy, and one cut is sufficient to secure it all. He saves a little time by this method, but he gets a coarse quality of hay that stock will not grow fat on, and which is not nutritious. I am told by many farmers that they will try the new plan in the future, and put the short, light cut on the market early.

"The farmers in the irrigated sections are this year experimenting with sugar beets, and the indications are that the plan will work well. I find Nebraska farmers giving a good deal of attention to stock feeding this year. The corn crop will probably be about 300,000,000 bushels, and if it is the number of cattle fed in Nebraska this fall will be something enormous. There are today more than 1,000,000 cattle in this state, and as many more hogs and sheep."

AGAINST STATE CESSION.

In discussing the question of irrigating the arid lands of the West, which question has come prominently to the front during the past few years, the only important difference of opinion arises from the small minority, who urge that these lands should be ceded by the Federal Government to the States and Territories in which they are located. A leading advocate of this policy in the West is Mr. Murphy, the energetic and enterprising Governor of Arizona. We have taken strong ground against such policy, which we believe would prove disastrous to those who are looking for homes in the West, although it would doubtless serve to enrich a few speculators. As showing the danger of entrusting the handling of such public plunder to State Legislatures,

it is only necessary to point to the personnel and record of the recent California body. What sort of a chance would the people have had, if to that Legislature had been entrusted the disposition of the Government land in California, no matter what nominal restrictions might have been provided for?

AN INCORRECT STATEMENT.

At the close of the recent Trans-Mississippi Congress, in Wichita, a dispatch was sent out and published by the press throughout the country, to the effect that Gov. Murphy had won a victory, and carried his point, in securing a resolution favoring the cession of arid lands to the States and Territories. The Resolutions of the Trans-Mississippi Congress and the record of its proceedings, as published in the Wichita local papers, do not bear out this press dispatch, that—

"The action taken had been in the nature of a compromise in committee, rather more favorable to the out-and-out cession of arid lands to the States than to the construction of storage reservoirs by Federal aid, for which \$200,000,000 was asked. Previous statements that the resolution passed was an unqualified indorsement of the storage reservoir plan are too sweeping."

As we read the resolutions, it would be hard to understand how they could be made any more sweeping in favor of Federal storage reservoirs. The Trans-Mississippi Congress at Wichita indorsed and adopted in full, word for word, the resolution of the National Irrigation Congress, which was as follows:

"We favor the preservation and development of our national resources by the construction of storage reservoirs by the Federal Government, for flood protection, and to save for use in aid of navigation and irrigation the flood waters which now run to waste and cause overflow and destruction, as recommended in the report of Col. Hiram M. Chittenden, and we urge the adoption of the recommendations of this report as to the construction of storage reservoirs in the arid regions as a part of the national policy of internal improvements." . . .

In substance, as shown by the Irrigation

Congress resolutions, indorsed and adopted by the Trans-Mississippi Congress at Wichita, the policy on which those two Congresses have united is that the Federal Government should build storage reservoirs as internal improvements; that the States should be empowered to lease all the grazing lands and collect the revenues and expend them in the construction of State irrigation works, leasing the title in the Federal Government until actual settlement; that wherever necessary the Federal Government should build the irrigation works to reclaim the arid public lands, and favoring State cession.

"Only upon conditions so strict that they will insure the settlement of such lands by actual settlers in small tracts and absolutely prevent their monopoly in large bodies under private ownership."

The resolution embodying these strict conditions was passed by the Phoenix session of the Irrigation Congress, and again passed at the Cheyenne session last September, and introduced in the Trans-Mississippi Congress at Wichita by George H. Maxwell, of California, with the other Irrigation Congress resolution.

GOV. MURPHY'S RESOLUTION DEFEATED.

Gov. Murphy, of Arizona, introduced the following resolutions:

"Resolved, that the General Government should, by Congressional act, relinquish jurisdiction and ownership of the arid lands, and cede them to the States and Territories wherein they are situated, and this Congress requests the Congress of the United States to pass the proper act ceding the arid lands to the States and Territories in which they lie."

This resolution was not adopted, but the resolution of the Irrigation Congress, as to cession under stringent restrictions and conditions, introduced by Mr. Maxwell, was adopted. without change of word, by the Trans-Mississippi Congress, and the dispatch above referred to is manifestly erroneous when it states that "the result was conceded to be a virtual victory for Gov. Murphy." . . .

The contest in the Trans-Mississippi

Congress was squarely made, and fought out to the end between those advocating absolute State cession, led by Gov. Murphy, on the one hand, and those advocating the policy of the Irrigation Congress as a whole, led by George H. Maxwell, who was supported by such leading members of the Irrigation Congress as I. D. O'Donnell of Montana, chairman of the Executive Committee; L. W. Shurtleff, of Ogden, Utah; Col. H. B. Maxson, of Nevada; Thomas Knight, of Kansas City, and others.

THEY STAND SIDE BY SIDE.

There could be no more positive evidence of the complete success of those who fought to bring about this complete harmony between the Irrigation Congress and the Trans-Mississippi Congress than the fact that the latter adopted the Irrigation Congress resolution with the following preamble;

Resolved, That the Trans-Mississippi Commercial Congress indorses the following resolutions which embody the resolutions and policy advocated by the National Irrigation Congress as to a national and State irrigation policy for the reclamation of arid America.

Here again, the falsity of the dispatch referred to above crops out. The dispatch says "this fight was the feature of the congress, as it indicated the growing divergence in interest between the Trans-Mississippi Congress and the National Irrigation Congress."

There could have been at this session no more complete and perfect "convergence" than that which has taken place. The two congresses have come together entirely, and are in perfect harmony. On this fact the people of the West are congratulated.

ARIZONA MOST BENEFITED.

The statement in the dispatch that \$200,000,000 was asked for, is on its face a manifest misstatement. No such sum was or is asked for. It is apparent that the dispatch was not sent out from Wichita without a purpose, and that those who, like Gov. Murphy, still advocate the policy of absolute state cession, are the most

serious obstacles in the way of the adoption of the broad policy of the Irrigation Congress—the reclamation of the arid regions and the great prosperity that would flow from it to all sections of the West and to all branches of business throughout the United States. Arizona has more to gain from the adoption of the Irrigation Congress policy than any other State or Territory. Its inauguration would start a tide of immigration into that Territory which would transform its deserts into fertile fields, and make it a populous and prosperous State in less than ten years. Every Western State and Territory, particularly Arizona, should stand by the Irrigation Congress and its wise policy.—*Los Angeles Times*.

ARTESIAN WELLS.

Another possibility among the diversified blessings showered upon Washington is the artesian water supply, Moxee valley, near the Coast range being an absolute proof. Water must exist in immense quantities in subterranean lakes under the vast region which is traversed by the Columbia. The peculiar contour of the channel of that river in Washington and the nature of the country through which it passes make certain the presence of the reservoirs of nature. Moisture filtering through the gravel to the bed rock of what ages ago was an inland sea has made for itself hidden lakes and streams which never see the light of day. Natural drainage from lakes and river close to the northern boundary line has added to this supply of water until the basin of Central Washington must be honeycombed with deeply concealed water supplies.

The matter has been given little or no attention. Heretofore irrigation ditches have been the popular methods of supplying the dry region with water and the supplies have been drawn from sources miles from the land to be irrigated. It has been a successful method, however, for where there are streams in Central Washington, the supply of water is

practically unlimited, and the results in an agricultural way have been most flattering. The success of the Moxee artesian wells should pave the way for appropriations of money by the state and national government for boring wells in other sections of the Inland Empire, for they will reclaim lands now considered absolutely valueless except for grazing purposes. The fertility of soil is established beyond doubt, once water is to be had. Climate conditions are matchless, and communication with markets easily established. The artesian water supplies will bear closer investigation as Washington grows in density of population and available agricultural land areas become more limited.—*Spokane Review*.

WILL IT BE SUSTAINED?

An interesting decision was recently rendered by a California court in the case of Mrs. Mabb against the San Antonio water company for damages. The plaintiff purchased of the company a certain amount of water which was not received, because it could not be obtained that year. Some water was offered but not in sufficient quantity for the fruit trees and as a consequence, so says Mrs. Mabb, her fruit crop was a failure. She sued the company and obtained damages to the amount of \$2,500. The *Times Index* (San Bernardino, Cal.) says:

"Much interest has been taken in this suit by orchardists and water companies all over Southern California, for in a way it settles the question of just how much water companies can be held responsible for the shortage in water for irrigation."

It is not yet known whether or not this case will be appealed, but it is regarded as a test case to determine whether irrigation companies may be held responsible

for crop failures due to lack of water, and if it is appealed, and the decision of the lower court is sustained, many more suits of a similar nature will probably come up.

BUYING FOR CASH.

The advantages of the cash buying principle are much more highly appreciated than formerly. Present indications point to the fact that at no very distant date that the long drawn out interest bearing account will be a thing of the past. Cash buying is a business short cut, it is the little path that leads across the fields. It saves business distance.

Not only that, it is a money making principle. Buying for cash saves interest; interest—money—saved is money earned. Cash selling and buying has gradually led up to another method of conducting business, which is to sell direct from the manufacturer to the consumer. This system possesses so many advantages that we cannot stop to enumerate them here. It is really the carrying out of the cash buying plan upon an extended and enlarged form.

Goods are sent upon receipt of cash or are shipped C.O.D. with privilege of examination. Take for instance the Elkhart Carriage & Harness Mfg. Co., of Elkhart, Indiana. They sell everything they make direct from the factory to the consumer. Their terms are either cash with order or C. O. D. with fullest privilege of examination, and their experience is that the cash buying principle is growing upon the people. By far the greatest percentage of their orders contain cash remittance. This is very complimentary to the Elkhart people and their fair business methods. They are undoubtedly the largest manufacturers of vehicles and harness in the world selling direct to the consumer.

ODDS AND ENDS.

DIRECTOR-GENERAL WILSON.

Dr. William P. Wilson, director of the Philadelphia Commercial Museum and director general of the National Export Exposition, to be held in Philadelphia next fall, is a man of unusual intelligence and of marked executive ability. In the year 1893 he conceived the idea of founding a commercial museum, using as a nucleus the raw products exhibited by different nations at the Chicago World's Fair. He secured authority from the city of Philadelphia, and succeeded in having donated to the proposed museum the large collections of natural products exhibited by nearly every country, especially the Spanish-American countries. Since that time his plans for the successful organization of the museum have been carried out, and the result has been very helpful to the commercial interests of this country. The National Export Exposition, of which he is the director general, will be under the auspices of the Commercial Museum and Franklin Institute, and it will do more to expand and extend the trade of this country than any other exposition ever held.

Dr. Wilson was educated at the Agricultural College of Michigan and at Harvard University where he afterwards was instructor in botany. He also spent several years in the universities of Germany and Italy, receiving the degree of Doctor of Natural Sciences from the University of Tubingen. For several years he was professor of botany and director of the school of biology in the University of Pennsylvania.

Since the organization of the Commercial Museum he has visited Europe several times, traveling through England, France, Germany, Switzerland, Italy and other countries for the purpose of studying the economic and trade relations. In 1897 he made a long trip through Mexico to secure accurate information of the resources and

trade conditions of that country for use of the museum, and in 1898 he visited Venezuela for the same purpose. Dr. Wilson is a man who is always active, and who possesses the faculty of imparting his earnestness to those around him.

WHAT THE CAT THOUGHT OF THE FOURTH.

At about the usual time in the evening I was thrown out of doors, with no idea of what the next day was to be like. My owner has a very disagreeable habit, of thus putting me out every evening to spend the night as best I may—a very unkind proceeding in my way of thinking—and the third of July was no exception to the rule. I had heard some idle talk about the "Fourth," but paid no attention to it. Human beings so often talk about the most foolish things—things of no interest whatever to me—so that I have 'got into the habit of paying very little heed to what they say unless they speak directly to me, when of course politeness bids me listen, or unless I hear them talk of milk or meat or mice. While as I say, I did not listen to their foolish chatter, I heard snatches now and then that made me think the "Fourth" was something that happened every now and then for they spoke of "last Fourth" and "the Fourth a year ago" and one of them took me up and said, "This will be your first Fourth of July, Kittie," but I was sleepy and did not listen to the rest.

It was a wet, nasty night. No one but a human being would dream of putting a cat out in such weather, but my mistresses are such great big giantesses I dare not resist, so with outward weakness but inward rebellion I crept down stairs and went under a convenient box to avoid the weather. There was nothing of importance going on—no other cats seemed to be about—so I settled down for a good night's rest. It

must have been about midnight when I was awakened by the most frightful noise! Why, I never heard anything like it in my life before! Whistles, and bells, and something that must be guns, I thought. I had heard my mistress read of a great battle somewhere and of the roar of cannons and so on. We cats just use our claws and teeth as nature intended, in a fight, but people are so queer, they have guns and cannons and swords and fight in the daytime. When I heard the awful din I decided people were having a battle. But as near as I could understand it the battle was in a foreign land, and yet here I was, right in our backyard under a box and yet the horrid roar kept up. My hair rose with fright and I know my tail was twice its usual size, I peered out cautiously and seeing nothing ran up to the back door. I couldn't get in, so I ran under the house, soon the noise ceased and I went to sleep again. Just as soon as it began to get light that awful bang, bang, commenced again, only it seemed very near, and I could hear the children shout Oh, but wasn't I frightened! I dared not venture out to see what was going on, but just crouched down in the darkest corner I could find. By and by,—after ages it seemed to me—I heard my mistress' familiar voice call, "Kittie, Kittie," and I poked my head out very carefully. Everything was apparently just as it was the night before and my mistress said, "Come and get your breakfast, little kittie," so in spite of the dreadful pop, pop, bang! that was going on, I ran up the steps into the house. But oh, that horrid noise! I would settle down to have a little drink of milk when—bang! would go something, and away I would scamper into the front room under the lounge. I heard my mistress say, "Poor little kittie, he is so afraid of the fire-crackers," and then she laughed. I did not know what she meant and did not see the joke, but I was glad to have her take me up and hold me tight. Well, that dreadful noise kept on and after a while some one said it was the "Fourth of July," whatever that may be. I only know it kept on all day and I almost had heart failure I was so frightened and the night was worse than the one before, for the queerest things could be seen in the sky.

It made me think the world was coming to an end and I was rather glad of it. But the next morning I woke up with everything just as usual—no noise, no pop bang, and so I concluded that what they called the "glorious Fourth" was just some more of human being's queer notions. I hope it won't come again soon though. L. W.

FASHION NOTES.

Fashion notes say that the old-fashioned sun-bonnet is to be revived and become the proper head gear for the summer girl of '99. Upon reading this bit of fashionable intelligence editors wax eloquent upon the beauty and becomingness of this article and grow quite foolish over the memories called to mind of youthful sweathearts in the alluring sun bonnet. When I read such idiotic drivel my blood boils, and I feel constrained to arise and denounce with all my feeble might that abominable bit of gingham.

Those editors are, without doubt men, and therefore were never forced to wear this same sun-bonnet. But with me it is connected with my childhood days—in fact was the "thorn in my rose," the trial of my life. A stiffly-starched checked sun-bonnet hanging on a nail is to me a reminder of past tortures, the badge of past oppression—and the strap fit to rank with the shingle.

It is claimed nothing is more becoming; that to peep at a young face under a coquettish white or pink bonnet is to fall in love at once. As to my looks, of course, I cannot say, not having the gift of "seeing myself as others see me," but of my feelings—words fail me. A starched sun-bonnet, rattling stiffly about your ears to the exclusion of all other sounds; with its cape behind to shut out every bit of breeze; its strings tied in uncomfortable bows under your chin; is certainly the hottest most uncomfortable abomination that was ever worn on human head. "Put on your sun-bonnet!" was the war cry of my mother when in my early childhood I ventured out of doors. It was sun bonnet government with a vengeance, and my childish soul yearned for emancipation from that checked horror as a slave yearns for freedom. It was the cause of more unhappiness than any other one

thing. And even now, when at home for a visit, I cast an apprehensive glance over my shoulder and tread quietly past the "bonnet" that hangs by the door, whenever I go out bareheaded into the glorious sunlight. I never so freely realized that I was actually grown-up, of age and my own mistress, as I did when, that warning call being sent after me, "put your bonnet on," I turned in the first glow of newly-acquired liberty, drew myself up to my full height, and with the remembrance of former oppression cried "No, I'll not," and went victoriously into the warm sunlight that was to spot me with freckles innumerable and give me besides a fine coat of tan. No, never again will my summer days be haunted with that nightmare of a sun-bonnet that embittered my childhood. I am emancipated from its dominion, never again to fall beneath its sway, let

the dictates of fashion be what they may. But when I read of a man admiring and upholding such a fashion I long for vengeance. Could I but see him toiling up a dusty country road on a hot summer's day, with a green and white checked gingham sun-bonnet tied securely under his perspiring chin, his hair damp with moisture; and could I see him again with flushed face looking out from the depths of his nice warm bonnet, essaying vainly to untie the strings which have become hopelessly tangled and wet with sweat; could I see him thus, then, and not till then could I feel avenged and grant forgiveness. A pretty girl never looks prettier than when her face is in the half shadow of a sun-bonnet scoop, and it is to the credit of latter day fashions that there should be a revival of so fetching a mode.

BACK THERE IN OL' MISSOURY.

Back in ol' Missouri, when the acorns tumble down,
When the Hick'ry nuts are fallin' an' the leaves are turnin' brown,
When the ripe persimmons hang like golden nuggets in the trees,
An' the luscious pawpaws ripen in the frost bejeweled breeze,
When the odor of the 'possum tempts the native appetite,
An' the barkin' of the coon dog wakes the echoes of the night—
Tell you what, it makes a feller feel homesicky-like and queer
When he thinks of ol' Missouri an' the rural pleasures there.

Back there in ol' Missouri when the autumn has begun.
When the fat an' sassy pun'kins lie a blushin' in the sun,
When the smell of apple butter livens up the atmosphere,
An' the quails are whis'lin' music mighty ticklin' to the ear,
When the cider mill is chawin' up the apples in its jaws,
An' the huskin' bees are bnzzin' in the golden Cupid cause;
That's the time a feller harbors the opinion mighty flat
That this life is worth a livin', an' is pow'ful cheap at that.

An' the gals back in Missouri, in their frocks of calico,
Used to wonder what sich angels was a doing here below.
Cheeks a bloomin' like the posies in their own dear native woods
With a tint they never gobbled from apothecary's goods.
Never carried no attractions built on fashionable style,
Allus snared the gallant fellers in the network of a smile,
Never needed stays to cinch 'em into shape that will eclat—
Natur' with her skill precluded the necessity fur that.--*Denver Post.*

WITH OUR EXCHANGES.

SATURDAY EVENING POST

A recent issue of the *Saturday Evening Post* contains an article by John Ingalls entitled "Famous Feuds," in which the three men who were once so prominently before the public, are again brought to mind by this brief history of their bitter enmity. The three men are Blaine, Conklin and Lamar. Those who can remember the circumstance will like to read the account of the encounter between Conklin and the latter in the Senate, and also to read Blaine's sarcastic utterances against Conklin. Sarcasms so keenly pointed as to end any semblance of friendly feeling that had ever existed between the two men and make them life-long enemies.

MCCLURE'S MAGAZINE.

Those who read the delightful "Boyville" story which appeared in an issue of *McClure's* last winter will welcome another by the same author in the July issue, and if that is possible, a better one—William Allen White understands boy nature and "James Sears: A Naughty Person," who has to churn on Saturday morning and who, while thus engaged, "promised God that if he would let him grow up *his* little boy should never have to churn," is familiar to us all. He is such a natural, lively boy; his naughtiness is so boyish, so familiar that the tale is a delightful one from beginning to end.

In view of the commotion caused by the automobile in some of the parks, the leading article in *McClure's* as to "The Automobile in Common Use," by Ray S. Baker, will interest many. He tells of its cost, how it is operated and what it will do—three things which any one who is progressive enough to care to read of new inventions, will be glad to learn. The article is well illustrated. "The Unsolved Problems of Astronomy," by Prof. Simon Mewcomb; the continuation of the story of the "Gentleman From India," and the papers regarding Lincoln, with short stories make up the very interesting July number.

THE FORUM.

The *Forum* has a number of interesting

articles this month. Among them are: "The Trust Problem and its Solution," by ex-Senator W. Pepper; "Lord Rosebery and the Premiership," by H. W. Lucy, who contributes the weekly "Essence of Parliament" to *Punch*; "Was Columbus Morally Irresponsible?" by Prof. C. Lombroso, the eminent criminologist; and "The Future of the Negro," by W. H. Council, the colored president of the Agricultural and Mechanical College of Negroes, at Normal, Alabama.

In an article entitled "The White Race and the Tropics," the Hon. Truxon Beale meets the objection to expansion, made by many, that the white race can never colonize the tropics. Mr. Beale argues that the advances of science, and modern inventions tending to minimize the actual manual labor devolving upon those engaged in agriculture, must before long render out-door occupations as little dangerous to health in tropics as they are in some parts of the United States during the summer months. Further, that just as the dangers of smallpox have been reduced to a minimum, so yellow fever and other tropical scourges will be stamped out, or at least reduced to insignificant proportions.

LADIES HOME JOURNAL

"Half way between Munich and Salzburg is the third castle—Herrenchiemsee—built by Ludwig II," writes Professor J. H. Gore in the July *Ladies' Home Journal*. "This great structure is incomplete, fortunately for overtaxed Bavaria, for no one could surmise what its cost would have been. One room alone—the renowned bedchamber—could not be duplicated for less than a million dollars. The vaulted ceiling is one great allegorical painting, the rounded cornice is covered with a score of richly framed mural paintings, the walls are panels of hammered gold of intricate designs, and even the floor is of marvelous pattern. The only suggestion of the purpose of this wonderful room is the sixty-thousand-dollar bed with its canopy more magnificent than any that covers a regal throne.



ALKALI FLAT ON SECTION 2. FORMERLY A FERTILE ALFALFA FIELD.

THE IRRIGATION AGE.

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THE PROGRESS OF WESTERN AMERICA.

**The
Curtain
Falls.**

The curtain dropped on the last act of the Luetgart tragedy, when the dying body of Luetgart was found in his prison cell. In recent years there has been no case in court which attracted the interest that the trial of Luetgart did. The evidence of the crime although circumstantial was yet so conclusive as to leave little doubt in the minds of most people of Luetgart's guilt. Yet the jury hesitated: the faint doubt of his wife's death, the bare possibility of her reappearance some day caused them to fix the penalty at life imprisonment instead of death. The whole gruesome story of the fiendish murder and the careful attempts made to conceal the same—to the final unraveling from minute evidence of the crime, sounds more like a fanciful tale from the pen of a novelist than the record of an actual occurrence in a practical, unromantic city like Chicago, with such a prosaic personage as the sausage maker in the role of heavy villain. With Luetgart's death the tragedy is at an end, and while most people are convinced of his guilt, to some there will ever remain a doubt. Among the many peculiar things—one might say coincidences—in this case, is that in so short a time, little more than a year, two of the most prominent figures in the case, Luetgart, and inspector Schack, have died: two, the women most interested, have married, and, lastly, another case so similar in every detail, has been tried.

The Becker case is almost parallel with the Luetgart; the men looked alike, followed the same business, and disposed of their wives in equally revolting ways,

while in both instances there was the usual "woman at the bottom of it." Had Luetgart's sentence been that of death, it is possible Becker would have hesitated to commit his awful crime, but the sentence of life imprisonment by most people was interpreted to mean a few years in prison, a pardon, and a lucrative opening in the saloon business or as a dime museum "freak," with the woman for whom the crime was committed as his companion.

Becker, however, has been sentenced to death. Perhaps the greatest of all mysteries in the Luetgart case is the fact that three women should have cared for such a brute.

**In the
Land of
the Free.**

With all our boasted civilization there is yet room for great improvement. A record of seventy-seven cases of lynching from January 1, 1899, to the present time, in the United States bears out the above statement. Of these seventy-five have occurred in the southern states, Georgia having contributed twenty-two—nearly one-third. Out of the seventy-seven victims to mob violence sixty were negroes and some of them were tortured in a manner almost incredible in a civilized community. Not satisfied with cruelly torturing and then killing the victims, the mob even went so far as to take away portions of flesh as souvenirs of the ghastly affair. For such fiendishness there can be no excuse. Of the twenty-two men who were lynched in Georgia, all but one were colored and in three instances the alleged crimes for which they suffered were resisting arrest, race prejudice; using violent language, most of

them were due to race hatred pure and simple. So frequent and so cruel have these affairs become in Georgia that it is time for the better element in the state to rise in its might and suppress the lower one—the perpetrators of such dastardly deeds—Hon. Dupont Guerry, of Macon, Ga., says in this connection:

"Lynching once established readily extends to crimes not originally contemplated, and, unless restrained, ultimately to acts of crimes."

The *Chicago Tribune* says: "The problem which the people of Georgia must solve is not the amendment of the law. There is law enough and it is strong enough, but the law-abiding people must give it their moral support to make it effective in securing the obedience if not the respect of the depraved of both races, for every time they defend or apologize for a lynching, to that extent they still further weaken the law. If the people of that state are wise they will give heed to Mr. Guerry's words: 'Mob violence, instead of being better or a substitute for law, is but crime itself; crime set off against crime; crime that diminishes respect for all law among all people and thereby multiplies the violations of all law, human and divine.'"

A Good Word for the Child.

A writer has come to the front with a good word for the American child. A rare circumstance in view of the fact that the public in general holds up its hands in holy horror at the youngsters of this country. They are as a rule considered a mixture of impudence and precociousness—tolerated by their immediate family, tabooed by boarding houses and landlords and regarded as a necessary evil by "grown-ups." If, then, some one rises in their defense it is well to listen, especially as the arguments advanced are such logical ones. The writer in question, Charlotte Perkins Stetson in a recent issue of the *Saturday Evening Post*, after acknowledging that American children as a rule are lacking in reverence, are forward and often impudent; with little if any restraint at home, draws attention to the fact that they develop into more law-abiding citizens, and are better men and

women than those of any other country. As children they are subjected to less restraint and are impatient of correction but as they grow older they are patient, even under imposition. The writer holds that the "Old Adam" must break out in us sooner or later and that the rebellious nature of the child brought up in an atmosphere of repression and restraint, breaks into revolt and anarchy in the adult. We learn by experience and "forget wisdom" is the best, so the child, brought up in the free atmosphere of the American home is early taught to rely on his own judgment; he learns from his mistakes, and is good from the love of goodness, not from fear.

Through the process of this gradual growth, the period of his education at the famous school of experience is such a trial to his friends and relatives as to make them wish he might be "brought up in a barrel and fed through the bung-hole until 18 years of age," yet it is good for the child and helps to mould him into a reasoning, fair minded citizen, who does right because it is right, not because he has been forced to do it.

A Good Example.

The famous actress, Olga Nethersole, has followed the example of many illustrious predecessors of planting a tree in Tower Grove Park, St. Louis, near the statue of Shakespear. Around this statue, there is now quite a little grove planted by members of the dramatic profession and very appropriately christened "The Forest of Arden." Aside from its beauty, the grove holds a romantic interest, each tree being planted by some famous actor or actress, who thus testified their admiration for the great dramatist. This is a beautiful idea and one that might be advantageously followed by ordinary mortals. If the farmer would plant a tree to commemorate the important events of his life, his old age might be spent beneath the shade of stalwart trees and the bare desolate yards, now so common, would be seldom seen. The question often occurs "Why do country dwellers take so little advantage of their opportunities?" A farmer may have acres and acres of land; yet his house will be small and his family

-crowded into smaller space, in proportion, than the city family of moderate means. Why have a bare front yard? Why have the bedroom ceilings so low that they may be touched easily in the slanting part of the room—and there generally is a slanting part? In short, why will country people get so little out of life? These hot, dusty days when as a famous writer said it makes one "want to take off his flesh and sit around in his bones," for coolness, it would seem that a cool place under the trees, where one could look up through the moving leaves and see the blue sky, would insure happiness. Yet the farmer's eyes are often closed to this beauty. He sells his freshest vegetables, hoards his eggs, is sparing of his milk, and works early and late with no time to enjoy nature, for the doubtful pleasure of "moving into town" just in time to die. A city lady exclaimed over the beauty of some ferns. "Nothin' in the word but brakes answered the farmer in disgust, "and the meanest kind of thing to get out of a field."

**Farming
with
Brains.**

We present in this issue a portrait of Dr. Clarke Gapen and a brief biographical sketch of him taken from the *National Advocate*. In a personal letter recently received from Dr. Gapen he gave his views on agriculture as follows: * * * "I am especially interested in high class farming—'farming with brains and education'—farming not as it is but as it may be. I see in the return to the farm and the fuller utilization of its opportunities the only escape from the dangerous tendencies of the time toward oligarchy and imperialism. The father of a family with ten acres which he can irrigate if necessary, is safer from the oppressions that bear upon the average man who earns his living by the sweat of his brow than is any mechanic, and the republic is far safer in such hands than in the hands of those who for bread become slaves to immense corporations, without souls or other interest in their workmen or their country than what they can get out of them. The possibilities of irrigation, both in the humid and arid regions, open the best field for an independent livelihood now existing. I have just returned from a beautiful little valley in this State (Wis-

consin) in which most of the homes are of brick and contain the modern conveniences, including hot water or steam and a telephone in every house. A more intelligent, self-reliant and independent community would be hard to find anywhere."

**Dr. Clarke
Gapen.**

A great service has been rendered to the irrigation cause by Dr. Clarke Gapen, formerly Superintendent of the Illinois Eastern Hospital for the Insane. He has by actual experiment demonstrated that even in such a State as Illinois, where irrigation has been heretofore unknown, the productiveness



DR. CLARKE GAPEN.

of the soil may be increased fourfold by the application of water in just the right quantities and at just the right times. Where water may be easily had, as in Illinois, the importance of this demonstration is inestimable. Her thoughtful men are seeking for some solution of the problem of what is to be done with the millions of wage earners who are crowding her cities and demanding work or bread. Dr. Gapen has blazed the way for a solution of the problem for them. If but a small quota of the enterprise displayed by Chicago in creating the World's Fair were turned to creating rural homes on small acre holdings for her laboring classes, the dangers of social disorder which now threaten

Chicago would vanish like mists before the sun.

Dr. Clarke Gapen, while superintendent of the Eastern Hospital for the Insane at Kankakee, Ill., devoted much time and energy in developing plans which were a great benefit to the State and public at large. In reply to an inquiry as to how it happened that he is so much interested in farming operations, the Doctor stated he supposed that it originated from the fact that during the war his people, being Union sympathizers in the South, were driven from their town home, and coming north were unable to find any place to live except on a farm on the outskirts of a town where he attended school. He was then a very delicate boy of thirteen, and his father concluded that outdoor exercises would be the better thing for him, and consequently kept him at work during vacations "clearing up" the little farm. Two summers spent in this worked a revolution in his health. He has, therefore, always been a believer in exercise, or work, as a producer of health, as well as of all the other good things we enjoy. The Doctor prescribes outdoor exercise, and encouraged and stimulated a large outdoor activity among the 2200 patients under his charge. He stated that he had found inactivity the bane of thousands, and especially those confined in institutions for the insane. The Doctor was born near Morgantown, W. Va., in 1850; his early education was obtained there at the old Monongahela Academy, which, with two other educational institutions, won for that place the sobriquet of the 'Athens of the Monongahela Valley.' It is now the seat of the University of Virginia.

The parents on his father's side were Quakers; his grandfather, notwithstanding his Quaker principles, fought through the entire war, and then settled in Western Pennsylvania as a surveyor. The Doctor left home when about nineteen years of age, and for two or three years engaged in teaching in Harrison County, W. Va. He then came to Chicago in 1872 to study medicine, graduating from the Chicago Medical College in 1875, and entered the Cook County Hospital the same year, which position he resigned to accept a position in the State Hospital for the

Insane at Madison, Wis. At that place he was assistant physician for three years, meanwhile having been elected to a professorship in the law department of the State University. He resigned from the hospital in 1878 and entered upon a general practice in medicine, continuing his relations with the University. In 1887 he severed his connections with the University to go to Omaha, which was then growing rapidly, and was the first commissioner of health of Omaha. He organized and established the sanitary department of that city. Having contributed a portion of his accumulations and, as he felt, fulfilled his mission in that part of the world, he returned to Chicago in 1892, and was elected to the superintendency of the Illinois Eastern Hospital in 1893.

Upon the election of Governor Tanner, in 1896, Dr. Gapen resigned his position as superintendent and removed to Madison, Wis., where he is now engaged in the practice of medicine. By his experiments while in charge of this institution, he demonstrated conclusively the value of irrigation even in humid regions, and has done more for the furtherance of the cause in this section than any other person.—From *National Advocate*, January, 1897.

To J. A. Breckons, editor of *Senator F. E. the Wyoming Industrial Journal*.

Warren, we are indebted for the following sketch of Senator F. E. Warren, of Wyoming:

United States Senator Francis E. Warren, of Wyoming, is the champion of irrigation interests in Congress. By a notable speech and herculean efforts to secure government aid for western irrigation works during the closing hours of the last session of Congress, he brought the needs of the West more forcibly and distinctly before Congress and the country at large than had ever been done before, and advanced the cause of irrigation many years with that ponderous, slow-moving body, the Congress of the United States.

Senator Warren was born at Hinsdale, Massachusetts, June 20, 1844. His ancestry is traced in direct line to the Warrens who landed on the New England shores when the Pilgrim Fathers were painfully laying the foundations of the great republic.

lic. To this family belonged, among other noted men, General Joseph Warren, the hero of Bunker Hill.

Young Warren's boyhood was spent on the farm; his school days being limited to a few week's attendance in the middle of each winter in the district school. At fifteen, after the death of his mother, he be-

he enlisted in the famous Forty-ninth Massachusetts Volunteers.

As a private soldier Mr. Warren was with his regiment at Plains Store, Donaldson, and in the engagement before Port Hudson. During the siege of the latter place the Forty-ninth was ordered to furnish a contingent of volunteers from each



SENATOR F. E. WARREN.

gan to feel the need of a more liberal education. To secure it he went to work for a dairyman for small wages in order to get funds to pay for his board while attending the Hinsdale academy where he went to school until the breaking out of the civil war, when at the age of seventeen

company for the dangerous duty of preceding the column of attack, and filling up with fascines the ditch in front of the enemy's earthworks. Warren was one of the volunteers. As the forlorn hope, as it was termed, marched on the field, fire was opened upon it from all of the opposing

batteries and the loss was terrible, three-fourths of the detachment being killed or wounded. The fascine which Warren carried was struck by a cannon ball, and though not seriously injured, he fell, stunned by the concussion and lay several hours unconscious. In later years Congress recognized the bravery of those who took part in this affair and awarded the survivors medals of honor.

When he was mustered out of service, Mr. Warren returned to his native town where he accepted employment as superintendent of a stock farm. He remained here until the spring of 1868 and became an expert in the work of grading and ditching, milling, blacksmithing and carpentering. At the age of twenty-three Mr. Warren decided to go west. For several months in 1868 he worked as superintendent of construction on the line of the Chicago, Rock Island and Pacific Railway, and in June of the same year, on an urgent request from Mr. A. R. Converse, he went to Cheyenne to take charge of his general store in that frontier town. At that time Cheyenne was a place of tents, cabins and shacks. The terminus of the Union Pacific had been moved westward and there was a general feeling that the existence of the place was but a matter of a few months, and that it would soon become one of the many "dead cities of the plains," marking the advancing line of the railroad. Mr. Warren did not share in this feeling and he decided to make Cheyenne his permanent home. During the thirty-one years which have since elapsed he has been one of the most essential factors in the business and political life, not only of the city of Cheyenne, but of the state of Wyoming.

In 1871 Mr. Warren became a partner with his employer, the firm for six years being Converse & Warren, when he purchased Mr. Converse's interest. A few years later the business was enlarged and incorporated under the title of the F. E. Warren Mercantile Company, which now conducts one of the largest mercantile establishments in Wyoming. Between 1873 and 1880 Mr. Warren devoted much time to raising sheep and cattle. During this time he was a member of the stock firms of Guilterman & Warren, Miner &

Warren and Post & Warren. In 1883 he organized the Warren Live Stock Company, which is now one of the most extensive sheep owners in the west. In addition to his mercantile and live stock interests Mr. Warren is identified with the Electric Light Company, the Cheyenne Gas Company, and has extensive real estate interests in Cheyenne.

During his thirty-one years residence in Wyoming Mr. Warren has filled acceptably a number of positions of trust and honor. In 1872 he was elected a city trustee. Before he was thirty he was elected to the Territorial Legislature, serving as president of the upper house. In 1884 he declined the nomination for Congress unanimously tendered him by the republican party of Wyoming. For six years he was treasurer of the territory. In 1885 he was elected Mayor of Cheyenne, and while holding that position was appointed Governor of Wyoming by President Arthur. One of the first tests of Governor Warren's executive ability was the anti-Chinese riots at Rock Springs in 1885. By prompt and decisive action to protect the Chinese residents of Rock Springs and Evanston he was warmly commended, not only by citizens of Wyoming, but by the people and government of the United States. Mr. Warren continued to act as governor under the Cleveland administration until in his report he strongly criticised the policy of Land Commissioner Sparks, when he was removed. He was reappointed by President Harrison in 1889, and in 1890 was elected governor at the first state election held after Wyoming was admitted to statehood.

At the meeting of the first state legislature Governor Warren and ex-Congressman J. M. Carey were elected United States senators. Both were sworn into office December 1, 1890, and their terms decided by lot, Mr. Warren drawing the short term which expired March 4, 1893. In 1895 Mr. Warren was again elected to the senate receiving the unanimous vote of the republican members of the legislature.

Robt G. Ingersoll. "Robt. G. Ingersoll is dead." This announcement caused great surprise. We pictured the great skeptic as well, strong, jovial, never associating him with the thought of the grim reaper. The end came, as perhaps he would have wished could he have had his choice—swiftly—painlessly. No lingering on a bed of sickness but a sudden end that found him surrounded by his loved ones.

Often people have speculated as to what manner of death this great free thinker would die: ministers have prophesied at the last an agonizing struggle, a great turning to the religion derided during health and perhaps a "death-bed repentance." But his death gave them no theme of horror from which to point a moral. It would be vain to try to count the number of sermons which have been preached on Ingersoll's death or in which the great agnostic was mentioned, and upon reading the things said against him by many of the ministers throughout the country, one is compelled to wonder whether it was the sincere desire to benefit their hearers or a little bit of personal feeling against one whom they could not vanquish during his life, that actuated them in choosing their theme.

A man of great brain power died; a man who lived, as all are forced to confess, a good life, who was a faithful husband, a kind father, a true friend, a loyal citizen, humane, philanthropic, whose only creed was to do the right, who believed that "Hands that help are better far than hands that pray" whose crime was that he dared to doubt. A few days later there died in prison a man guilty, in all probability, of one of the most brutal crimes on record—of low instincts, cruel, unfaithful, base. Which one did the minister take for his text when he wondered if there were mercy for such as he? Of which one did he say it was best that he should die? Surely not of the good man. Yes, even of him for he dared to doubt. We must not be understood as upholding the stand Ingersoll took upon religious questions; he claimed to be an agnostic—one who does not know—but he was in reality an iconoclast, tearing down man's beliefs and giving him nothing better in

return, but we do condemn the ministers of the gospel who pretend to judge this man and speculate as to where his eternity will be spent. "Shall not the Judge of all the earth do right?"

Years hence, Col. Ingersoll will be recognized as one of the great reformers, for while his methods are not to be entirely approved of, he has, in reality, done more for religion than any other man of our day: he has taught the doctrine of humanity, of tolerance, of goodness, for its own sake; has forced people to become more liberal-minded. He was intolerant—not so much of religion itself as of the creeds and can't. And we must not forget that "to assail false creeds is not to attack religion and to pluck the mask from hypocrites, is not to raise an impious hand toward the crown of thorns."

"DECLARATION OF THE FREE."

[From "The Truth-seeker" of June 3, 1899—Ingersoll's Last Composition.]

We have no falsehoods to defend—

We want the facts:

Our force, our thought, we do not spend

In vain attacks.

And we will never meanly try

To save some fair and pleasant lie.

The simple truth is what we ask,

Not the ideal;

We've set ourselves the noble task

To find the real.

If all there is is nought but dress.

We want to know and bear our loss.

We will not willingly be fooled

By fables nursed;

Our hearts by earnest thought are schooled

To bear the worst;

And we can stand erect and dare

All things, all facts that really are.

We have no God to serve or fear

No hell to shun,

No devil with malicious leer.

When life is done

An endless sleep may close our eyes.

A sleep with neither dreams nor sighs.

We have no master on the land,

No king in air,

Without a manacle we stand.

Without a prayer,

Without a fear of coming night

We seek the truth, we love the light.

We don't bow down before a guess,

A vague unknown:

A senseless force we do not bless

In solemn tone.

When evil comes we do not curse.

Or thank because it is no worse.

When cyclones rend—when lightning blights,
 'Tis naught but fate;
 There is no God of wrath who smites
 In heartless hate.
 Behind the things that injure man,
 There is no purpose, thought or plan.

The jeweled cup of love we drain,
 And friendship's wine
 Now swiftly flows in every vein
 With warmth divine,
 And so we love and hope and dream
 That in death's sky there is a gleam.

We walk according to our light,
 Pursue the path
 That leads to honor's stainless height,
 Careless of wrath
 Or curse of God or priestly spite,
 Longing to know and do the right.

We love our fellow-man, our kind,
 Wife, child, and friend,
 To phantoms we are deaf and blind,
 But we extend
 The helping hand to the distressed;
 By lifting others we are blessed.
 Love's sacred flame within the heart,
 And friendship's glow;
 While the miracles of art
 Their wealth bestow
 Upon the thrilled and joyous brain,
 And present raptures banish pain.

We love no phantoms of the skies,
 But living flesh
 With passion's soft and soulful eyes,
 Lips warm and fresh,
 And cheeks with health's red flare unfurled.
 The breathing angels of this world,

The hands that help are better far
 Than lips that pray.
 Love is the ever-gleaming star
 That leads the way—
 That shines not on vague worlds of bliss
 But on a paradise in this.

We do not pray, or weep, or wail;
 We have no dread,
 No fear to pass beyond the veil
 That hides the dead.
 And yet we question, dream, and guess,
 But knowledge we do not possess.

We ask, yet nothing seems to know;
 We cry in vain.
 There is no "Master of the Show"
 Who will explain.
 Or from the feature tear the mask;
 And yet we dream, and still we ask:

Is there beyond the silent night
 An endless day?
 Is death a door that leads to light,
 We cannot say.
 The tongueless secret locked in fate
 We do not know. We hope and wait.

Death touched the lips that spoke and bade them
 cease;

Said to the restless, questioning spirit "peace",
 Death called, and without fear or groan
 He passed from earth to the great unknown.

No longer need he question hopes or dream.
 Or speculate on the Creator's scheme.
 Death, the magician, maketh all things plain
 Gave him knowledge that he sought to gain.

L. R. W.

IRRIGATION AND FORESTRY.

DENUDING OF THE FORESTS A DETRIMENT TO IRRIGATION.

By JOEL SHOMAKER.

Irrigation and forestry are so closely allied in the arid west that one cannot be neglected or improved without having a corresponding effect upon the other. The forests are the natural reservoirs for conserving soil moisture, and the fertilizing silt necessary to plant life is held in solution until by the ingenuity of man, the water carries it in artificial irrigating channels to the fields of the farmer or fruit grower in the valleys. Every ruthless destruction of the native forest causes more or less trouble to the water users down below. In some instances where the mountain slopes and canyon basins have been denuded of forest vegetation, by fire, lumbering, or grazing the streams have rushed down in perfect floods, destroying thousands of dollars worth of property in their pathways.

Fifteen years ago I inspected a large area of Wasatch Mountains; in Utah, by riding on horseback over the summit and through the canyons. The entire district was then a perfect arid mountain paradise of all classes of natural vegetation. The grasses and native weeds stood two to four feet in height and the undergrowth of the forests was a perfect mass of shrubbery. Today the picture has changed to an almost barren, desolate appearing waste, cut into dusty paths, tracked by numerous roads and washed beyond recognition from the many dragways made by hauling timber to the loading places in the canyons. Everywhere may be heard the bleat of the sheep, the sound of the woodchopper's axe or the rattle of the lumber wagon.

A few days ago the people residing in the valleys beneath this peak of desolation witnessed a most destructive flood, which destroyed many thousands of dollars in property, decreased real estate values fully fifty per cent. and piled up masses of mud and debris on every street and road, causing disease and distress everywhere in the flooded district. This was the fourth recurrence of such a disaster, in the past eight years, and the evils remain unchanged. The place referred to is Manti, located in a beautiful spot 'neath the Wasatch Mountains, in Sanpete county, Utah. One hundred thousand dollars would not recompense the inhabitants of this city for the losses sustained from the floods, caused by the denuding of the forests in one canyon, their source of water supply.

The same condition exists in scores of Utah cities and in many

ther sections of the western States, where the canyon sources of water supply are situated near the cultivated fields. The continual feeding upon the undergrowth destroys the natural protection for the snowbanks and removes the sod which holds the water in check until it gradually finds its outlet in the springs and streams beneath. When a shower of rain falls upon these barren foothills and roadcut watersheds the water at once forms into little rivulets and rushes for the wasteways in the larger stream beds. The volume increases as it moves down the slopes and when it reaches the valleys, where it should be clear and pure, it is but a rolling mass of death dealing germs and an uncontrollable flood of destruction to everything in its path.

A few years ago, before the wholesale and unmerciful slaughter of the forest trees and the greedy devouring of vegetation, a heavy rain in the mountains was regarded as one of the beneficent results of arid conditions, but today it is watched as closely as the cyclone cloud of the Mississippi Valley, because its dangers are equally as great to those in its line of destruction. Before the denuding of the hills the people looked upon the mountains and rejoiced at the heavy snowfall being drifted into banks every winter for supplying the irrigating water the following summer, now they become alarmed at the clouds lying heavily over the canyons and begin to prepare the streams for carrying the excess of spring freshets, which they have learned to expect.

The residents of the western states are forced into the necessity of resorting to forest growth as a precautionary measure for self protection. The beautiful mountains become dangerous foes when robbed of their mantles of grandeur. Efforts must be put forth for preserving those forests. One important move is the keeping of all grazing animals away from the canyons and summits bordering on streams used in the valleys below, and another is to prohibit timber cutting where it will destroy the forests. Utah has a law prohibiting the cutting of under eight inches at the stump, which is good so far as it goes.

In the early days when the pioneers of western colonization required all the assistance possible for reclaiming the deserts and building up in the arid lands, the eminent domain was a great boon, giving all an opportunity for pasturing on the general government area. But conditions have changed and the era of small farming has come over the west. The day of extensive ranges is practically over. If stockmen would plant their farms to alfalfa and feed the hay upon their own lands, they would reap better profits than under the present range feeding plan. The stock, if properly cared for would become better and more profitable if the ranges were left in the native state and every man looked after his own, as in the eastern states.

The changes to be made will have to come about by local organization for forestry cultivation and protection, by state and national

legislation and educating the people to more domesticated lives of husbandry. Every city should own and control the canyons on which their waters are carried for domestic and culinary purposes. These canyons should be reforested by native, quick growing trees and shrubs, and some of the hard wood trees of the limestone regions added for experiments. The work should be in the hands of several city councils, county courts or other local or municipal officials, who might appoint competent foresters for superintending the work of planting and caring for the trees and shrubbery.

There are many locations in the Rocky Mountains and the western spurs suitable for natural reservoir sites, if systematic forestry was practiced. The small basins, shaded by quakenasp and other trees were once ideal reservoirs, holding the snows and rainfall in check until late in the summer months. These basins have been tapped, the sodded banks destroyed, and the protecting undergrowth and large trees eaten out by stock, burned by fires or cut away by timber hunters. The old conditions must be present before those sites will deliver water as in pioneer days or the beauty of the mountains can be recognized as in former days. A few private reservoir sites have been located, but they must be well fenced and carefully guarded to prevent destruction by roving stock and thoughtless loggers.

The general government has taken up the subject of protecting the old forests and in some instances prohibited the cutting of timber in certain districts. This action has been severely criticised by some interested parties, who pretend to believe that the forests are public domains that will never be exhausted. Some prosecutions have been made and those guilty of infringing upon the forbidden boundary lines have been and made to pay the value of the timber cut and destroyed. This measure has been fought in the courts and in Congress, but it is merely the interference of our great government in behalf of her people when those benefitted cannot see the necessity for such actions. The time has come when general education is needed to create public sentiment in favor of systematic forestry in all the mountains of the realm of irrigation.



NATURAL VEGETATION OF THE MOUNTAINS.

IRRIGATION IN NORTHERN SYRIA.

TAPPING OF THE EUPHRATES, THE ORENTES AND THE TIGRIS, TO FILL THE "GRANARIES OF EUROPE".

EDITOR IRRIGATION AGE.

Dear Sir—I have just received your esteemed letter of the 1st. of June and I take this occasion to express to you my best thanks for your courtesy in so kindly aiding me to make known the wants of the Municipality of Aleppo in respect to irrigating implements. I have received several communications from leading firms in America who were made known to me through your kindness and I have laid their proposals before His Excellency Raif Pacha, Governor General of the Velayet of Aleppo who will consider them fully at the next general meeting of the council on behalf of the Municipality of the City of Aleppo when I shall have much pleasure to write you further on the matter. As you express the desire to be informed of the changes and progress being made in irrigation in these parts I will endeavor to review the matter briefly and I trust that this will serve in a manner as a guide to such American firms as may wish to introduce new implements into these parts.

The whole of Northern Syria including the vast plains lying in the districts of Aleppo and Adana, the immense water courses of the Euphrates, the Orontes, and the Tigris, are possessed of excellent soil and, were there means of obtaining an adequate supply of water, these lands would truly become to-day, as they were of yore, the "granary of Europe". Nevertheless water is not wanting: on the contrary it is abundant, one has but to dig a few feet to obtain a copious volume of clear water, while the rivers themselves flow invitingly by, seeming to challenge the cultivator of the soil to draw therefrom the source of wealth and plenty but, alas! they call in vain. He sees but cannot avail himself of this heavenly gift, for to him the complicated mechanism of the West is but a dream unrealizable and unattainable. The various turbines, the Dumont pumps, the different lifts, the mighty steam-engine, are but hollow sounds to his ears, nor would he approach them without a feeling of doubt and dread. The simple person as is the farm laborer fears and distrusts all that is above the level of his understanding, nothing terrifies him so much as the word "machine". And he is right! For in the desert where he lives hundreds of miles from the capital, the complications of most irrigating apparatus would be an

unsurmountable obstacle to their general introduction, without having at least skilled agents on the spot. If a part of his apparatus breaks down, a little screw or spring is lost or missing from whom may he take advice? And even supposing him to repair to town, to whom must he apply, of whom ask the piece without which his machine would be a dead weight? There is one fact not to be sufficiently insisted upon, and which American houses would do well to consider with much attention, that for the firms who wish to pioneer the irrigation age in this country, it is a matter of prime importance to have experienced capable agents on the spot, men who know their machines and have at their command all the necessary parts to replace and make good any accidents; for such firms it is no exaggeration to say that fortunes are in reserve for them. For in a country like this and especially considering the class of people with whom we have to deal—the farm laborer and the peasant—persons who, as every where else in the universe, think twice before acting, wary and doubtful of all innovations, who never invest a cent before being perfectly convinced that their outlay is not thrown away,—they do not require newspaper advertisements nor gaudily colored placards but palpable proofs, machines on the spot, with able representatives of the makers to introduce them and explain their advantages as well as their simplicity of mechanism.

No, till now the laborer resolutely sets his face against complicated contrivances which are beyond his capacity to understand, and rests in the depths of apathy, seeing his grounds a black burnt patch in summer, a feeble producer in winter and spring; never secure, for a long drought or a sustained heat may rob him of his promised crops and leave him in most precarious circumstances. He is withal content to live as did his fathers before him, receiving with gratitude the gifts of providence when plentiful, suffering with uncomplaining resignation when the fruits of the earth are too scanty to meet his wants. Had the movement for progress been left to the initiative of the peasant and tiller, things might so have remained till doomsday.

About three years ago His Excellency Raïf Pasha, who had recently taken over the government of this province, determined that an effort should be made to rescue these vast semi-arid regions from the grip of unproductive and sterile neglect. Throughout the whole of the district he saw that water was, and freely, found. It was then not the water itself which was wanting, but rather the means of employing it in a manner as economical as simple and at the same time efficient, for it is a matter of strict necessity to the farmer and cultivator, in a country where food supplies cost very little, that they should not exact too large investments for irrigation of the soil.

From the dawn of human ingenuity, for centuries unnumbered, wooden water-wheels of fearful form and cumbrous weight, huge monsters which gave grudgingly, were used along the river banks, requiring high dams and constant repairs, much attention for meagre

results. With what success? In winter a heavy, sullen, groaning revolution, turning at the will of the capricious currents, and at a time when water, in the form of rain, is showered down, thus reducing their value as an irrigating machine—in summer, when the heats were come, the dried earth cracked and crying, they would stand mockingly motionless in their sluggish currents, seeming to ridicule the puny efforts of primitive man.

Yet this, in its primordial state, was incomparably superior to the systems used on lands where no running water was to be had. Here the water had to be drawn by hand, or else a horse or an ox would be harnessed to a rope and by its weight and the declivity of the ground painfully draw up an insufficient supply of water, which seemed rather to irritate than saturate the ground. Or the ‘garaffe,’—the wooden noria, that perpetual circle of a beast condemned to tread its round from day to day—rotten planks, rotten cords, loss of time, loss of energy. This state of things might have boasted of its results in times gone by, but it must abandon the field to the march of progress and science.

His Excellency first gave his consideration to the most urgent wants: the lands which no streams water as they pass.

Here new and modern appliances were called into requisition, the air at least was at command, and must be utilized. And then a sudden transformation seemed to break through the silent sleep of ages. On all sides steel windmills rose towering in the horizon, new patent waterlifts replaced the old wooden ‘norias,’ chain and centrifugal pumps were called to lend their aid to cultivate the lands. Simplicity combined with efficiency began to call the farmer from his apathy and dullness. It is now being proved that the farmer may become in a great measure independent of the caprices of drought and heat. And he is waking to a sense of the possibilities of his state. For the rivers the bucket pumps, the steel water-wheels, the link belting water-raisers, the wind power irrigating pumps are crowding to the field, and ere long these erstwhile dreary stretches will be transformed to smiling, fruitful gardens: the summer heat and winter drought will both have lost their despotic power, and famine will no longer hover in the air ready to attack and desolate the fairest, finest lands that form the globe.

It is principally to America, the home of giant progress and rapid go-ahead, that His Excellency looks for aid to second his endeavors for introducing on a large scale ameliorations for the most practical means of irrigation with the simplest machinery and the least cost. It is to America the Governor General calls for assistance—by having capable agents on the spot—in the great undertaking of once again converting the barren plains and desert lands of Northern Syria into a smiling centre of blooming prosperity.

RAGHIB RAIF.

STILL MORE ABOUT THE DAM.

THE OPINION OF ONE OF THE ENGINEERS OF THE ELEPHANT BUTTE DAM COMPANY.

EL PASO, TEXAS, July 17, 1899.

EDITOR IRRIGATION AGE:

I wish to thank the AGE for its impartial presentation of the Elephant Butte dam controversy in your issue of July. In his article, Mr. Barnes has, through ignorance or prejudice, wrongly anticipated the decision of the courts and misrepresented facts about the water supply of the Rio Grande for this year.

It now develops that the decision of the Supreme Court is wholly favorable to the company, as all points of law in the case have been decided in favor of the defendant and one question of fact only left open for investigation, and we know now that that question of the effect of the condition of the river at El Paso on the almost infinitesimal navigation down at the gulf is nil because the latter, such as it is, is still going on, while the river at El Paso has been dry for more than two months. So Mr. Barnes has been quite premature. He is equally unfortunate in his attempt to warp the facts of the past annual snow fall in Colorado and the dry condition of the river at El Paso into proof that we are wrong in our claim that there is water enough for several reservoirs.

It is quite true that in certain localities the snow fall in Colorado last winter was exceedingly heavy, and it was the general expectation here that an abnormal flood would come down the Rio Grande. But the flood did not come, and investigations in the early spring developed the fact that an exceptional thing had happened in Colorado, viz., none of the heavy snow fall had occurred on the watershed of the Rio Grande but, on the contrary, the fall over the latter area had been exceptionally light.

The dry condition of the river at El Paso is thus accounted for. It is always sad to see a man rush into print and make himself ridiculous through ignorance. I will assume that the latter is the trouble with Mr. Barnes, for the other horn of the dilemma, viz.: that he would knowingly try to warp facts to suit his purpose, is even more uncomfortable.

Now, Mr. Barnes' argument that there is not enough water is based entirely on the disjointed statements of fact, viz: "There was a heavy snow fall in Colorado," "the Rio Grande rises in that State." "The latter is dry at El Paso." Beautiful logic, that! But to my

certain knowledge it is on a par with the arguments of the opponents of the Elephant Butte dam generally.

We have shown repeatedly by authentic figures that the average yearly flow of the river is quite sufficient for all purposes of irrigation for the entire valley.

An exceptional season like this proves nothing. We have other seasons quite as exceptional for their abnormally large flow of water. Mr. Barnes' statement that the conditions of this year are to be expected every season in the future is entirely without foundation and is not in accordance with his own observation. If he were right, it would be silly to carry this matter farther, since there is now no water to store.

I wish to call your attention to another fact, viz.: It has been charged that my company would store and divert the whole flow of the river at Elephant Butte and deprive El Paso of all water. This is senseless, seeing that the capacity of our proposed reservoir is but 253,009 acre feet, while the mean average annual flow of the river approximates 1,000,000 acre feet. Moreover, our reservoir, to use Mr. Barnes' words, would be "just above El Paso." Now, if this is true, what in God's name are we going to store all that water for? Hardly just to keep it there to look at. It must be used, and in so doing, it must pass down the valley to El Paso.

As a matter of fact, our reservoir would be 112 miles above, and there is plenty of water to pass on down to the El Paso reservoir. There has never been any necessity for conflict between the two enterprises, and the whole trouble arises from the hallucinations of the advocates of the International Dam.

Now, another fact. While we have been condemned in vigorous terms as a soulless corporation that would divert the whole water supply, the advocates of the International Dam would do the very thing they so emphatically condemn in us. In fact, their whole fight on us has originated in their desire and intention to prevent any storage whatever except at El Paso, thus creating an absolute monopoly at the latter place, in violation of and without any regard to the rights of New Mexico. You will please notice that El Paso is situated just three miles south of the south line of New Mexico, and if storage must be confined to that point, it leaves then the latter high and dry.

Water appropriations in New Mexico from the Rio Grande are as old as those in Texas and Mexico, and her rights are identical there with. Mr. Barnes speaks of a certain treaty to be made between the United States and Mexico to permit and authorize the building of the International Dam. He neglects to state some of the reasons that would make such a treaty necessary. He also fails to say that the draft of the treaty as actually prepared by interested government officials would grant an absolute monopoly of the water, preventing any further diversion or any storage in New Mexico.

The advocates of the El Paso dam foresaw that, if their most absurd contention that the Elephant Butte dam would obstruct a navigable river should, by any accident, be sustained by the courts, it would also operate to prevent the building of the El Paso dam. A special treaty would therefore be necessary to permit the obstruction of a navigable river.

These facts throw some light on the sincerity of the ostensibly philanthropic attitude and solicitude of our opponents touching an equitable division of water.

I also wish to deny that there was general rejoicing over the prematurely heralded reports that the court had sustained the contention against the company. On the contrary, much the greater part of the people of El Paso have always given our company substantial aid and encouragement.

I am sorry that Mr. Barnes' name must be mentioned so frequently. He is a very nice and intelligent gentleman, but is merely an incident in this controversy, due doubtless to the fact that he belongs to the clerical department of a large mercantile house in Juarez), Mexico, whose manager is one of the most determined advocates of the international dam.

Yours very truly,

J. L. CAMPBELL.

Chief Engineer R. G. D. and I. Co.

WINDMILLS FOR IRRIGATION.

FACTS OBTAINED FROM THE COMMISSION OF FORESTRY AND IRRIGATION TOPEKA, KAN.

It has been thoroughly demonstrated during the last few years that the steel back-gearred mills are the best for pumping water; and it has also been demonstrated that, while the new mills are more powerful than those constructed a few years ago, still there is room for improvement in many directions. The demand for windmills for pumping water for irrigation is stimulating inventive genius, and we have reason to expect steady progress. We are now looking for the mill that will so adjust itself to the velocity of the wind that as the wind increases the load will be increased. Such a mill would run in a very light wind, and at the same time regulate itself by increasing or decreasing the load. The demand for the improvement above mentioned will be easily seen when we stop to consider that the windmill will increase the number of strokes as the velocity of the wind increases, until at a certain point, when it is regulated for the sake of safety to throw itself partially out of the wind, and some will not pump at all in good stiff winds that should (if properly harnessed) bring up large quantities of water. There is one other improvement that should be demanded of the windmill manufacturers, and that is, that they improve their mills so they will catch more of the wind. The company that will lead off on these two lines, with a good, strong mill, will capture the trade. There is a well-founded prejudice in the minds of many against the very large windmills. We venture to predict that when the mills are perfected the twelve-foot mill will pump more water on the average than the sixteen-foot mill will at the present time.

HOME-MADE WINDMILLS FOR PUMPING WATER.

We cannot go into a thorough discussion of home-made windmills at this time for different reasons; one reason is, that it hardly seems necessary on account of what has been said and published on that line. The most common home-made mill is doubtless the Jumbo, which does good work and lots of it, if properly constructed. They are often constructed with sufficient power to run a large pump at each end. The power should be increased by increasing the length instead of the diameter of the wheel. The wheel which has very much diameter will move very slow in a wind that will give good motion to one of about one-third less diameter, provided it is not overloaded. A steel shaft is much the best, and a pulley should be placed on one end so that a brake can be attached. Where the water

is near the surface a wheel six feet in diameter and sixteen feet in length will run two ordinary pumps in a good wind and one in a light wind. One objection is that they were not self-regulating.

Where the Jumbo mill is close at hand and it is rigged with a brake, it is not much trouble to stop and attach another pump. A very effective way of stopping it is to have doors on the north and south low enough that when they are opened the wind will strike the fans and counteract that which strikes them above. The doors can be hung on the inside and so arranged with springs that they will regulate the speed of the mill in a high gale.

WINDMILL TOWERS.

Before deciding on the height of the windmill tower, the obstructions should be taken into account. If the mill is to be located in a low place, or there are buildings and trees around, make sure of getting it out of the way of the wind whipping around hills and buildings. Wind close to the ground is more or less retarded by friction, and mills will accomplish more if they are a fair height, though it is not often that a tower should be more than thirty-six or forty feet. There has been so many mills wrecked by the wind in the last few years, that it would seem as though people would use more judgment in the selection of anchor posts. Iron or stone are undoubtedly the best, and should be used if they can be had. Where they cannot be had, good locust or red cedar will answer, and Osage orange is good enough, if you can get them large, and that you can get holes through. Cross-pieces should be bolted at the bottom. Mower bars are very good if other irons are fastened across the bottom, as they are not any too long for safety.

RESERVOIRS FOR STORM WATERS.

Reservoirs for storm waters is a subject so broad that it seems almost useless to touch upon it where time and space must be taken into account, as they must be in this report. In the space devoted to this subject the writer will not attempt to cover the ground. There is one phase of the subject that should be kept steadily in view by all who are interested in great public questions, and more especially those who are most directly interested. In this subject of reservoirs for storm waters, some of the parties especially interested are the people of the great plains region, who lack only a quantity of water equal to the run-off to be prosperous and happy and ready to welcome the homeless; and the other parties especially interested are the half million people who, in 1897, were driven from their homes, and left their property and 20,000 square miles of territory under water. These people owned property in 1890 worth nearly \$22,000,000. This was not the first great flood in that locality, nor is it the last. Is it a trivial matter that the half million people are in danger of losing lives and property during a portion of the year? As the floods come rushing down from the north and west, they carry with them on their

mission of ruin the very cream of our soil, to fill that great national highway. The destruction of the forests and the continued escape of the storm waters from the great plains have continued too long already. Forest reserves must be established by states and by the national government, and large storage reservoirs established where the water is of the most benefit to the people, and this is the only solution to the problem.

LOCATION OF STORM-WATER RESERVOIRS.

There are several questions almost equally important that must be considered in the selection of a location. If it is intended to store the storm waters only, the reservoir will necessarily be built at one side of the channel of the stream, and may be close by, or at quite a distance from the channel. Where water rights have previously appropriated the regular flow, the ditch can be so graded as to take water above a certain level, and by selecting a location for starting the ditch from the stream where the bend of the stream is toward the ditch, a large portion of the storm waters may easily be secured. If the parties wishing to build the reservoir own the water rights which take the entire flow of the stream, then a dam may be constructed so as to give a steady flow. The mouth of the ditch should be provided with a strong water gate high enough so that in time of great floods the water may be kept back entirely, or in part. Sometimes the storage reservoir may be constructed across the channel of the stream. In order to determine this, investigation must first be made to determine how far it is down to bed-rock, and next, how much water can be retained; or, in other words, is the fall of the stream above the proposed dam such that a sufficient amount of water can be retained to justify the outlay?

Sometimes a location can be easily found on the bottom land along the stream where a storage reservoir may be safely and conveniently located, and water stored from a creek or from one or more draws.

Such a reservoir should be constructed on very much the same plan as the reservoirs constructed for pumped waters. Sometimes sites for such reservoirs as the one just mentioned can be found where there is a slight depression; and if such a place is found there is usually more or less gumbo to aid in retaining the water. In the selection of a location for a storage reservoir in a draw or ravine, the same questions must be taken into consideration as in the location of the dam across the running stream, with the additional question of whether the reservoir will not soon be filled with dirt or other rubbish; and in fact that question should not be overlooked in considering the feasibility of building any dam or storage reservoir. There will always be more or less silt deposited in the dam or reservoir, but where the storage basin is exposed to the wash from ploughed fields or abrupt slopes not well sodded, the enterprise will inevitably be shortlived. Many draws and ravines are now utterly unfit for storage

of water by reason of the debris which has collected and covered the bed-rock so deep that the expense would not justify the outlay for a foundation. There are, however, thousands of locations in Kansas, where dams and storage reservoirs can be constructed and made to pay, providing prices of farm produce can be maintained; and many of them can be constructed and made to pay, providing the interested parties will coöperate in the building and distribution of the water, even though prices fall again, as they may be expected to, for a time at least.

FACTS WORTH REMRMBERING.

An acre-foot of water is 325,851 gallons.

An acre of ground contains 43,560 square feet.

One cubic foot per second: 50 California inches.

One cubic foot per second: 38 Colorado inches,

One cubic foot per second, one day: 2 acre-feet.

One cubic foot per second, one year: 724 acre-feet.

A cubic foot of water weighs about 62½ pounds.

A cubic foot of water contains about 7½ gallons.

A gallon of water weighs about 8½ pounds.

A gallon contains 231 cubic inches.

An acre of ground covered with twelve inches of water is called an acre-foot, or 43,560 cubic feet, or 325,851 gallons of water.

A second-foot of water is the quantity represented by a stream one foot wide and one foot deep flowing at the velocity of one foot per second.

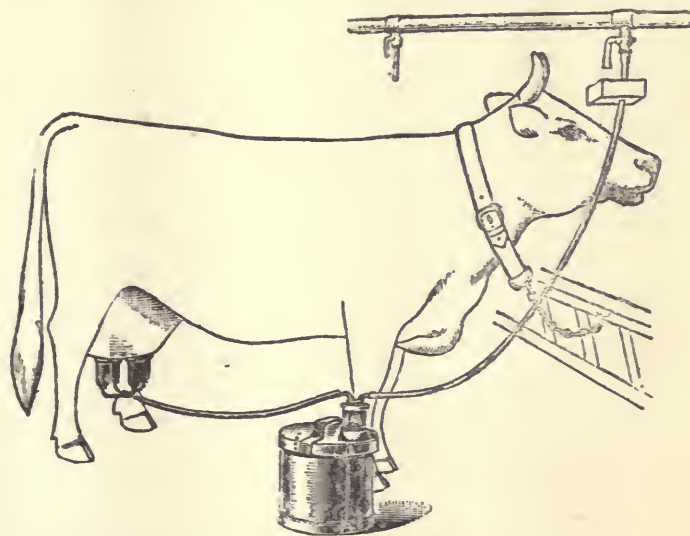


SNOW BANKS SURROUNDED BY VEGETATION.

A MILKING MACHINE.

WILL MILK TEN COWS AT ONCE.

When Dr. Clarke Gapin, now of Madison, Wis., was connected with the Kankakee (Ill.) insane asylum, he made a trial of a patent milking machine. This was several years ago and at that time the machine was the only one of its kind in this country. It was the property of the Thistle Milking Machine Co., of Glasgow, Scotland, the machines being rented not sold, the one at the asylum being put in for trial. A representative of the *Kankakee Gazette* who was present at the trial of the machine, gained the following facts regarding it:



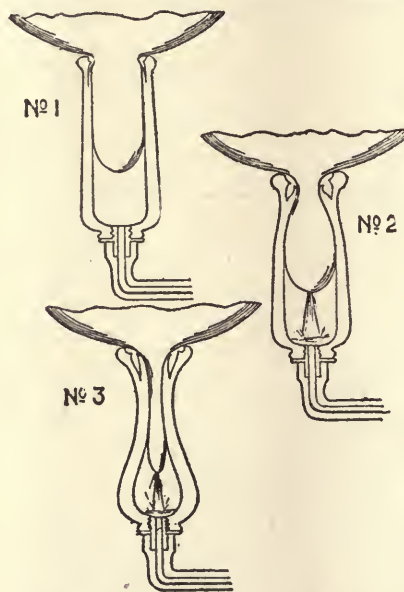
The principle upon which the milking is done is as follows: On the first floor of the cow barn are the pump and the vacuum tank. The former is worked by steam procured from the pasteurizing plant. The pump exhausts the air from the tank, the suction from there passing through a reducing valve that gives a constant suction of seven pounds in the piping running horizontally above the cow's heads throughout the stable. For every two cows a stop cock is fixed in the piping, to which is attached a little box, in size and looks much like a telephone transmitter, which is called a pulsator. Within that box is the key to the whole mechanism, the *modus operandi* of milking by machinery. The little transmitter (for such it really is) contains the mechanism which produces the rise and fall in the vacuum, or suction, in the teat cups. When the suction is least the teat cup is circular in form, as shown in Figure 1. As the suction increases the

acts as a valve and prevents the pulsations to descend below it into the bucket.

One man with six sets of milkers can milk 50 cows an hour; a horse on an ordinary tread-power can, with two men to attend and twelve sets of milkers, milk 100 cows per hour. The pails or cans are air-tight and thus exclude the foul air, hair, filth, etc. There are ten sets of the apparatus at the hospital, and the men in charge of the barns think the invention is a valuable one.

The artificial hands are made of good quality rubber and are called pulsating teat cups, being slightly corrugated on the interior. The four teats may be milked singly or collectively.

Dr. Gapen was enthusiastic over the machine, as were all others who have seen it operate. After one or two trials the cows take to it naturally, and the sight of ten cows being mechanically milked and without any apparent force, is an inspiring one and is calculated to cause one to think that the inventive genius is very much alive in man.



cup begins to collapse at the top, compressing the teat at the bottom, as shown in Figure 2. The still further increase of the suction collapses the cup, with a stripping action from the root to the tip. The air is then admitted to partially destroy the vacuum, allowing the cup to resume its original shape. This action is repeated 45 times a minute, and it comes as near the action of the sucking calf as can be done. Every time that the suction is reduced and the cup takes its original form, it allows the milk to flow down and fill the teat, the next compression forcing out the milk. The milk flows through a short piece of india rubber tubing into a glass milk trap set in the top of the milk receiver. The trap being of glass the flow of the milk can be observed and the suction may be withdrawn as soon as the cow is milked. The pulsator contains a small vibrating vacuum motor and the power to operate the valves in the box, and produces the pulsation. The pulsations do not extend to the milk pail, as the end of the milk trap that projects into the pail has a rubber ball which

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department, and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs. Also sketches or plans of convenient and commodious barns, hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us to improve the appearance of THE AGE?

THE USE OF CYCLONE CHURNS.

From time to time there has been introduced into the dairy community unique forms of churns. Hundreds of varieties have been patented, and the farming public as a result have suffered from the introduction of many of these experimental, undesirable churns.

Under ordinary conditions of churning, modern dairy authorities generally agree that churns should be free of all forms of inside paddles or dashers. This is because where different lots of cream are churned together at one time, they are often unevenly ripened, and butter comes from some of the cream sooner than from the other. The butter which comes first is more or less injured when struck and rubbed by the paddle or dasher, so that butter of inferior grain or quality is produced.

During the past few years, several forms of churns have been introduced in the United States that are advertised to bring the butter "in a minute and a half," and remarkable results are promised the farmer who uses one of them. These churns are of the shape of an ice cream freezer pail, and contain a set of arms or dashers near the bottom, that are revolved at great speed by a geared arrangement at the top of churn, operated by a crank handle.

In April and May tests were made of one of these churns at the Indiana Experiment Station. The churn was small of

capacity, so but eight pounds or one gallon of cream was used in each trial. The trials were made under as favorable conditions as possible to produce good butter. The cream was placed in the churn at a low temperature, ranging in the different trials from 53° to 56°. At the former temperature the butter came in seven minutes; at the latter in fifteen minutes. At 53° a yield of three pounds and one ounce of salted, worked butter was secured; at 56° two pounds and twelve ounces, was obtained. The amount of butter-fat left in the butter-milk showed that the butter had been quite satisfactorily separated from the cream.

The removal of the butter from this churn, however, was the objectionable feature. If the butter warmed up to 62°, a very common churning temperature on our farms, it could not be nicely removed from this churn. The paddles beat it considerably, and after giving such careful washings of the butter as seemed desirable, the contents of the churn in each case smeared in an objectionable manner. In winter, in a cold room, the work of the paddles would still be undesirable.

This type of churn, for the reason given, is not to be recommended over the standard barrel or box churn, free of all inside devices. The revolution of a simple barrel or box churn, containing no paddles, in a cool room with cream at 45° to 56° temperature, should give the most

satisfactory results to the dairy farmer.
—*Purdue University Agricultural Experiment Station.*

C. S. PLUMB, Director.

AMERICAN FARMER OF THE NINETEENTH CENTURY.

It used to be the rule that when a man wasn't fit for anything else he was considered good enough to be a farmer; that if he hadn't brains enough to master military tactics, or the intricacies of the law or medicine, or of theology, and was utterly lacking in creative ability, then his proper sphere of usefulness was the farm. And in those days even the "gentleman" farmer was a person of inferior standing, and he was made to feel his insignificance whenever he came in contact with the superior persons who ruled the State and made or expounded its laws. Society spoke of him as a "gawk," and his sons and daughters were "country bumpkins." But all this has changed and is destined to still further change. Science, which has done so much for the world at large, has taken the farmer in hand and is investing the man and his works with the dignity and standing that are theirs of right. The masses are being made to realize what they have known dimly all along but never fully appreciated—that it is the farmer who feeds them, and that he is more necessary to them than they are to him; that without him works great and small would come to a stop, and the peoples of all the earth be reduced to a state of savagery and cannibalism.

Science is bringing not only the public to a realization of the importance of the farmer, but the farmer himself to an appreciation of the importance of his work and of the necessity of fitting himself for it by studying nature and inducing her by scientific means rather than by haphazard to yield her store. Formerly the farmer could tell you "when" without knowing "why." Experiment showed him that rotation in crops made his land produce better and last longer, but he couldn't tell

nature's reason for it, nor explain the thousand other seeming mysteries of the soil. Science has done and is doing that for him. It is experimenting for him day in and day out the year round, and teaching him the why and the wherefore. Uncle Sam is backing science in this matter, and the farmer is getting the benefit without cost. The farmer learns from the bulletins that are sent out by the Department of Agriculture, and all over the land the farmer's sons and daughters are taking courses in agriculture and horticulture, farm gardening and dairying, and stock breeding and stock raising, in colleges supported jointly by the state and federal governments.

Their instruction is practical, too, for the colleges have farms under cultivation and herds and droves of cattle and swine, and dairies and truck farms and orchards. The instructors are men who are entitled to write "Bachelors of Science" after their names. They know all about the soils and the seasons, and what crops are adaptable and what are not; and their science goes so far as to include conditions in foreign countries, and to be able to judge from them whether corn, or wheat or barley, or whatever product of the farm will be most in demand for export, and so command the readiest market and the best price. They have reduced farming to a science, and are teaching it as a science. The course in agriculture includes history and government, French and German, English and the higher mathematics and music, so that our farmers of the next generation will not only know how to get the best and the most out of the ground, but will be able to hold their own for general information and polite accomplishments with the elect of any land.

Colleges of agriculture are maintained in universities, with the aid of national funds, in Arizona, Kansas, California, Georgia, Idaho, Illinois, Indiana, Louisiana, Maine, Minnesota, Missouri, Nebraska, Nevada, New York, Ohio, Tennessee, Vermont, West Virginia, Wisconsin

and Wyoming. In Massachusetts Harvard University has a school of Agriculture known as Bussey Institution. Besides these, agricultural and mechanical colleges have been organized in Alabama, Colorado, Connecticut, Delaware, Florida, Iowa, Kansas, Kentucky, Maryland, Michigan, Mississippi, Montana, New Hampshire, New Jersey, New Mexico, North Dakota, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, Utah, Virginia and Washington. Separate institutions of this sort are maintained for colored students in Alabama, Delaware, Florida, Mississippi, North Carolina, South Carolina, and Virginia. Massachusetts has the only college whose curriculum is wholly devoted to agriculture.

In the universities in which courses in agriculture are maintained, the general tendency is to make this course correspond in scope and thoroughness with those given in the other departments, to divide the instruction in agriculture among an increasing number of specialists, and to provide buildings and apparatus and illustrative material on a scale in keeping with those in other branches. At the same time efforts are making to bring the university in close touch with the masses of farmers through special schools, farmers' institutes, nature teachings, and other forms of university extension work. Along with this is the deepening and strengthening of the scientific and practical researches, carried on with a view to widening the world's knowledge of the facts, laws, and processes required for the improvement of agriculture.

The classes in agriculture in these schools range in enrollment from 200 to 900 students. The total enrollment is 30,000. The full course in agriculture covers four years, and practical farmers who know enough of other matters to make them intelligent and desirable citizens are being sent out from these colleges at the rate of 8,000 a year, or 80,000 in a decade. That they will assist wonderfully in the devel-

opment of the country need not be doubted. Their knowledge and training will enable them to get more out of the earth and themselves than the tens of thousands of other earnest and honest men who have taken up homesteads and gone to farming without any knowledge of or preparation for the cultivation of the soil.

In an article in the Year Book of the Department of Agriculture on "Some Types of American Agricultural Colleges," A. C. True, Ph. D., director of the government's experiment stations; describes the essential features of some of these institutions of learning. Of the Massachusetts Agricultural College, which is near Amherst, on a farm of 400 acres, situated in a most beautiful part of the Connecticut River Valley; he says:

"In 1897 the college had permanent endowment funds aggregating \$360,000; and its buildings, farms and equipments were valued at about \$315,000. The college buildings include combined dormitory and class-room building, chapel and library, laboratory for chemistry and physics, entomological laboratory with insectary, botanic laboratory and museum, drill hall, dormitory, president's house, several residences for professors, farmhouse, boarding-house, horticultural plant houses, and barns, including creamery and dairy laboratory. The experiment station also has a chemical laboratory, botanical laboratory with plant house and barns.

"On the farm 150 acres are under cultivation with a variety of field crops, and the extensive college barn is stocked with 100 head of cattle and equipped with the most improved agricultural implements and machinery. The horticultural grounds cover 100 acres, with orchards, vineyards, small fruit and vegetable plantations, and groves of forest trees. Much attention is given to floriculture and landscape gardening, and the ample plant-houses are well stocked with numerous varieties of exotics. Some eighty acres are devoted to the work of the experiment station, including numerous plot experiments with

varieties of field and horticultural plants, fertilizers, methods of culture, etc., feeding experiments with animals, soil investigations, etc.

"The laboratories of the different scientific departments are well equipped with apparatus for experimentation and demonstration and with illustrative material, such as specimens of plants, insects, animals and machines, particularly those of importance in their relation to agriculture. The library of 18,000 volumes has been carefully collected with reference to the needs of an agricultural college, and is thoroughly catalogued and managed with a view to providing the students every facility for obtaining the information they desire to gather from books. It is one of the most extensive and valuable collections of books on the science and practice of agriculture to be found in this country.

"The instruction is given by a corps of eighteen professors and assistants. The chairs include botany, chemistry, agriculture, horticulture, zoology, veterinary science, mental and political science, English and Latin, modern languages, mathematics and civil engineering, and military science and tactics. There is also a lecturer on farm law. The student is required to follow a definitely prescribed curriculum during three years, and in the last year of the course he is allowed wide latitude of choice among numerous specialties, English and military science being the only required studies."

For a time the college was open to men only, but women may now attend special elective courses in such branches as botany, entomology, horticulture, fruit culture, market gardening and dairying. Candidates for admission must be at least 16 years old and are required to pass examinations in English grammar, geography, United States history, physiology, physical geography, arithmetic, the metric system, algebra (through quadratics), geometry and civil government. The students as a rule room in the college dormitories, and are boarded in clubs or private fami-

lies. The expenses for room rent, board, fuel, washing and military suit for the college year are estimated to range from \$159 to \$300. Students performing labor at the college are paid by the State, and there are small endowment funds for the assistance of needy students. The students have their athletic associations and glee clubs and social amusements the same as at Harvard and Yale, and they are required to attend prayers and worship in the college chapel.

The Michigan State Agricultural College is the oldest in the country. It was established by an act of the Michigan Legislature in 1855, and for thirty years, like the Massachusetts college, had only an agricultural course. In 1890, under a materially increased income, a mechanical course was added, and later a woman's course. The laws of the State prescribe that it shall be a "high seminary of learning, in which the graduate of the common school can commence, pursue and finish a course of study terminating in thorough theoretic and practical instruction in those sciences and arts which bear directly upon agriculture and kindred industrial pursuits."

The college land, comprising 676 acres, is divided into the farm of 230 acres, devoted to field crops grown under a system of rotation, forty-five acres of woodland pasture, 114 acres of lawns, gardens and orchards, 240 acres of forest, and forty-seven acres of experimental fields and plats. The farm is equipped with cattle, sheep and swine of the principal breeds. There are an arboretum of 150 species of trees, a botanic garden containing 1200 species of native and foreign hardy herbaceous plants, with some shrubs, a grass garden of 200 species of grasses and clovers, and a weed garden of 100 species of the most troublesome weeds. The students in agriculture are required to work two and one-half hours a day on the farm or garden. The annual average expenses of students for board, room rent, heat, light, books, laboratory, and other fees are estimated at \$125. These expenses are

often reduced by receipts for labor performed on the farm or elsewhere about the college. There are thirty or more professors and assistants in the faculty, and in addition to the chairs provided by the Massachusetts College there are professors of mechanical engineering, domestic economy and household science.

The Mississippi Agricultural and Mechanical College is conducted on the same general plan, except that women and negroes are not received as students. Out of a total of 368 students entered last year 316 elected to take the agricultural course. By farm labor the students may reduce their expenses there to \$100 a year.

Over 800 students took the farming course last year in the Kansas State Agricultural College, in Manhattan. The college farm comprises over 300 acres, and is well equipped with live stock. The State has supplemented the United States grants by the erection of a number of substantial buildings, which are valued at \$350,000. Students of both sexes are admitted at 14 years of age, after passing an examination in reading, spelling, writing, arithmetic, geography, English grammar and United States history. Connected with the course of study here is industrial training in several of the arts, to which each student is required to devote at least one hour a day throughout almost the entire course. Young men may have farming, gardening fruit growing, woodwork, ironwork or printing. Young women may take cooking, sewing, printing, floriculture or music. Tuition is free, and the annual expenses of the student range from \$100 to \$200. Students are paid at the rate of 10 cents an hour for work.

The Iowa State College of Agriculture and Mechanic Arts is a flourishing and well attended institution. It has fifteen buildings, erected by the State at a cost of \$500,000, and these include a hall for women. There are besides dwelling houses for professors and other employes, a creamery, barns, stables, seed houses and forcing houses. The college lands, of which 120

acres have been parked as college grounds, are 200 acres in extent. "The farm," Mr. True says, "consists of rolling prairie, bottom and woodland, and is stocked with good representatives of five breeds of horses, six breeds of cattle, seven breeds of sheep and six breeds of hogs. These animals are used in class illustrations and for the various experiments in breeding and feeding for milk, meat, wool, growth and maintenance, conducted by the experiment station as a department of the college. All the crops of the farm are grown for some educational purpose; all the animals are fed by rule and system, and the results of their management reported upon and used in class work. Labor is not compulsory, but students in the agricultural courses are given work that is parallel with their studies. Some students pay for their board by work in the mornings and evenings. There is a practical working creamery and cheese factory in operation throughout the year. During the summer season from 15,000 to 25,000 pounds of milk are taken in daily and manufactured into butter and cheese. The number of students in 1897 was 573, including women."

In New York State the Agricultural College is an annex of Cornell University, and in 1897 there were 127 students taking the farming course. The tuition in agriculture at Cornell is free, and the yearly expense of the student ranges from \$300 to \$500. The "four years' course in agriculture is designed to afford an education as broad and liberal as that given by other departments of the university, and leads to the degree of Bachelor of Science in Agriculture. The college farm occupies 125 acres of land, and it is well stocked with dairy cows, sheep, horses, hogs and poultry. The dairy building is equipped with modern appliances and machinery for making butter and cheese. Ten acres are devoted to the gardens, orchards and nurseries of the horticultural department, which also has eight forcing houses. Candidates for admission to the Cornell agri-

cultural course must be at least 16 years old and pass examination in English, geography, physiology and hygiene, history of the United States and England, Greece or Rome, plane geometry, elementary algebra, and either Greek or Latin, and French or German, or advanced mathematics.

It is pretty much the same with all the other agricultural colleges. The student gets practical instruction and assists in practical work, obtaining at the same time the benefit of experiments made for the purpose of improvement in cultivation and in the quantity and quality of farm products. There is the same enthusiastic and, in some respects, extravagant devotion to athletics that obtains in other colleges, and there are musical, literary and social societies with more or less of clanishness and secrecy. There are college papers and annuals, in which some serious journalistic work and not a little lampooning is done. The students are leading earnest and useful and happy lives, and they are judged by the same moral standards as are men and women throughout the country. They do much severe mental work, and enjoy the sports and recreations of college life to the full.

With an institution of this sort in almost every State in the Union, the American farmer of the near future ought to be at the head of the procession of those who feed the world.—*Chicago Tribune*.

WINTER COURSES DISCONTINUED.

On account of insufficient appropriations by the Legislature, the trustees of The Pennsylvania State College have been compelled, along with other measures of retrenchment, to discontinue for the present the twelve-weeks Winter Lecture Course in Agriculture and the Cheese-making Course. The Creamery Course will be given as heretofore, beginning January 3d, and the work of the regular four-years' course and of the special one-year course, will go on as usual. Special efforts will also be made to increase the

efficiency of the Correspondence Courses in Agriculture.

SUGAR FACTORY.

If the Pecos Valley Beet Sugar Company were not doing business in Carlsbad there would not, on the 15th of every month, during active operations, be paid out to labor in the company's factory \$6000; there would not be paid to farmers for beets shipped \$10,000; there would not be paid to the railroad company a large sum for freight on beets in and sugar out; these sums would not be distributed among the people and the trade of Carlsbad and vicinity if there were no factory here. Farmers would be denied a cash market for a very profitable crop, and agricultural endeavor would be forced into another line of effort. But Carlsbad has the factory, and the result is that the sums mentioned will be paid out on the 15th of every month during the campaign. Farmers are guaranteed a crop that can be raised and sold with certainty and profit, and the agricultural and trade interests are founded upon a substantial and unchanging foundation.

This is what the factory means to Carlsbad at the present day, and with enlargement of operations its influence upon the property of the town and country will increase. Ten thousand tons of beets will be harvested this season. Next year the tonnage will be doubled. Every farmer raising beets this year will plant again, and plant increased acreage, while the aggregate number of growers will be largely increased. It will be as easy a matter to secure double the acreage the coming year as it was to secure the present planting this season.

W. H. Holabird, of Los Angeles, Cal., says of Pecos Valley and its sugar factory:

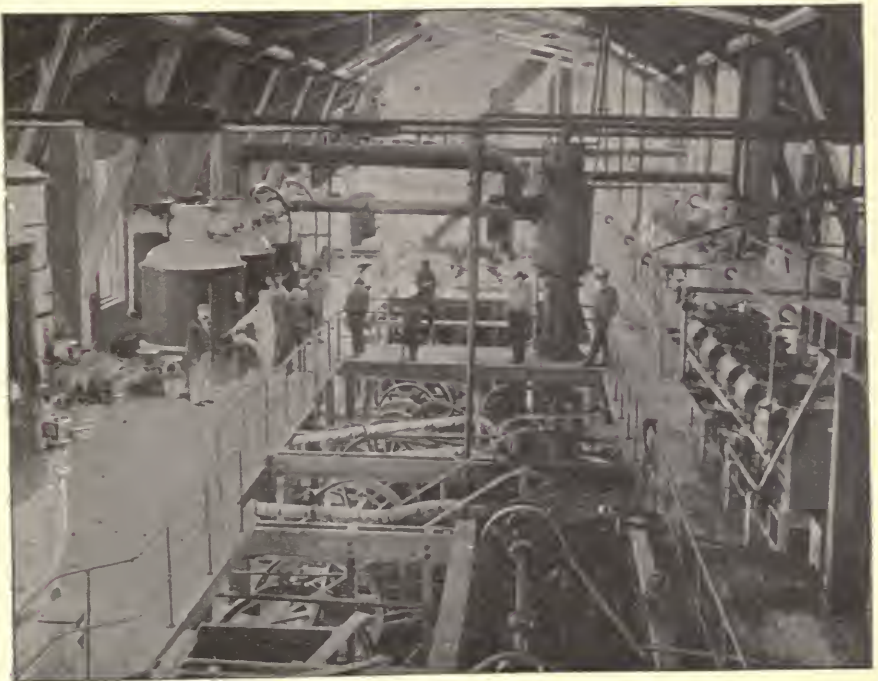
"Twenty-six years ago I began the study of soils in connection with the subdivision of railway land grants. It was most natural in the work engaged that I should carefully note the character of crops produced on certain soils and the conditions

surrounding the successful production of said crops. During this period my field of operations extended over the State of Michigan, through the entire length of the State of Kansas, the Territories of Arizona and New Mexico and the State of California. I mention this wide scope of country in order that you may appreciate the opportunities I have had for making not only a careful study, but an honest comparison, which is important in arriving at comparative conclusions.

"I have no hesitation in stating that I believe the Pecos Valley of New Mexico possesses attractions to the beet-sugar interests to a far greater degree than any other portion of the United States I have ever seen. I know of no other locality

where the industry can be extended to so great a magnitude, or where the actual results show so high a percentage of sugar in the beets.

"I can conservatively say that the intrinsic value of such land—with a large sugar factory centrally located—is not less than \$100 per acre. I have sold thousands of acres in California to beet-growers for an average of \$187.50 per acre, intrinsically not as valuable. From less than 6000 acres owned by the Ranch Company, at Chino, Cal., while I was general manager, we received over \$60,000 annually in rentals. Under the same intelligent culture the Pecos Valley beet lands will pay equally well."



INTERIOR VIEW OF BEET SUGAR FACTORY AT CARLSBAD, N. M.

PULSE OF THE IRRIGATION INDUSTRY.

PUMP IRRIGATION PROFITABLE.

At a recent meeting of the Fresno, Cal. Farmers' Institute Prof. Fowler spoke on the question "Will Pumping Pay?" The Professor had sent out a half hundred letters on the subject and deducted his opinion from them.

Almost without exception these answers showed the decided opinion that pumping will pay. The replies showed that an acre is irrigated at a cost ranging from 50 cents to \$14.50, and the man that had expended \$14.50 an acre for pump irrigation declared that it paid him to do it.

The speaker cited instances to prove his proposition, and urged that the Fresno county farmers try pumping for irrigation. He thought that in this way land in Fresno county could be irrigated for a cost less than \$1 an acre. This would be considerably cheaper than buying water from the irrigation company at the present rates.

Centrifugal pumps cost from \$75 upwards. Gasoline engines are successfully used for power purposes; also threshing engines are sometimes used, for which straw furnishes a cheap fuel.

It must be remembered that the profitableness of pumping for irrigation depends largely on the distance—or height—to which the water must be raised. Doubling the height means, practically, quadrupling the cost. Very large quantities of water can be cheaply pumped from shallow wells—say from ten to thirty feet. In this section, where surface wells run from sixty to two hundred feet, the cost becomes excessive.

Irrigation by pumping from deep wells can only be profitable where a large revenue per acre can be obtained. In this part of the country pumping by

means of windmills has proven a farce to many a man who has spent his hard-earned dollars for nothing, simply because he failed to understand the laws of hydraulics.—*Citrograph*.

POSTPONED DREAM.

Collier's Weekly recently contained the following from the pen of John Bonner:

In June, 1891, it was believed by many that the Colorado desert was going to disappear from the face of the earth. Ingenious speculations on the effects of the change on the climate of southern California appeared in the papers. But, with the summer of 1891, the water in the Colorado declined, and before the autumn there were only a few inches in the stream at Algodones. Meanwhile there was no relaxation in the terrific heat in the region now covered by water and the evaporation was immense. Maj. Powell estimated the annual evaporation at a hundred inches, which is only about half the yearly evaporation in the bay of Bengal. When the supply of water from the river fell off, while the loss from the evaporation continued, it was a mere question of time when the new sea should dry up. That is what happened, and dreams of reclaiming the Sahara of California were postponed until now.

Whether the freshet of 1899 will throw into the great hollow more water than the sun can lick up remains to be seen. The process of throwing the surplus water of the Colorado into the desert could, of course, be assisted by engineering works on the river bank; it is possible that they may be attempted this year. Lieutenant Williamson of the engineers, who surveyed the desert nearly half a century

ago, under orders from Secretary Jefferson Davis, reported that "a large portion of the surface of the desert formed of lacustrine and alluvial clay, is capable of supporting a luxuriant growth of vegetation. It is nearly of the same composition as the alluvial bottom land of the Colorado, which is covered with a growth of mesquite, cottonwood, and willows and grass. Good crops of corn, beans and melons are raised close by." Another writer said that "a sufficient supply of water to irrigate the Colorado desert would convert a hopeless waste, which is a terror to travelers and the home of the honored toads and rattlesnakes, into the most productive state of the union."

It may pay to watch the reports of the water gauges on the Colorado.

MORE SALT.

A Utah paper has the following to say regarding the salt works about to be opened up in that state:

There will be two independent salt works in full operation this year, and it may be truly said that this fact is due to the formation of the salt trust, which now virtually controls the entire salt output from Nephi on the south to Corinne on the north.

While the trust has succeeded in buying nearly all the salt plants in the State, and has thus been enabled to demand a price for that product in advance of what it sold for many years, the combination, it would seem, has not been without its good effects for some people. Owing to ruinous competition in years gone by, the price of crude salt was forced down as low as 60 cents a ton some years ago, and it is said that in some instances it even sold for less. And so it went on until one of the most important industries of the State was badly crippled, and many of those producing salt went out of business.

IRRIGATION INVESTIGATION.

San Francisco Chronicle: Elwood Mead, late of Wyoming, has been Territorial, and subsequently State Engineer of that State

for many years, until his resignation, quite recently, to accept the position of expert in charge of irrigation investigations in the Department of Agriculture. Mr. Mead's labors in Wyoming have given him a national reputation, and his translation to a broader field is a natural result of that work and is in the interest of all irrigated America. Mr. Mead is doubtless an able engineer, quite competent to deal effectively with engineering problems, but it is not merely as an engineer that he has won reputation. His important work in Wyoming has been the development of a system of water control, satisfactory, we believe to all good citizens, and its presentation to successive legislatures, in language so clear and simple, that convictions and action inevitably followed. As the result of his labors the problem of water control has been solved, in Wyoming, so completely that there has been but one irrigation suit begun in that state during the past ten years.

A petition has been prepared and in due time will be presented to the Secretary of Agriculture requesting that Mr. Mead's first formal work for the department may be to investigate and report upon irrigation in California, with the understanding that sufficient help be given him to enable the report to be completed and printed before the next meeting of the California Legislature. It is believed that the facts which he will collect and the conclusions which he will draw will form a basis upon which all interested can unite in formulating legislation which will cause irrigation waters to be properly and economically conserved and distributed, and an end be made to the disastrous litigation which is preventing the development of the state and is costing more than the construction of the works which it concerns. The water problem in California can never be justly dealt with until we know the volume of water discharged by each stream, the claims upon it, adjudicated and not adjudicated, the possibilities of profitable increase upon each stream by storage of winter waters,

the areas of irrigated and irrigable land in each system, and their ownership, and present and prospective value as measured by income. It is these and similar facts which Mr. Mead has been asked to collect and classify for us, with such recommendations as he may deem best to make as a basis for some comprehensive scheme of legislation. The detail is requested upon the broad grounds that the interests involved in this state are greater than in any other state, the litigation and uncertainty more disastrous, and especially that no water problem exists anywhere in America which does not exist here. It is hoped that when the matter is properly presented to the Secretary he will recognize the force of the argument and the wisdom of assigning Mr. Mead to the duty.

A NOTED CHAMPION GONE.

On the 8th of June Judge J. S. Emery, a prominent figure in irrigation matters, died at his home in Lawrence, Kansas, at the age of 76 years. He settled in Kansas forty-five years ago, being a member of the second party sent out to Lawrence under

the auspices of the New England Aid Society. He entered upon the practice of his profession and soon became a leader in the movement to make Kansas a free state. In 1863 he was appointed by President Lincoln United States district attorney for Kansas, holding the position until 1867. He is perhaps best known to irrigationists for his work in behalf of that movement, *The Daily World* (Lawrence) says of him in this connection;—"Of recent years Judge Emery has devoted his energies largely to irrigation and he has traveled thousands of miles, and delivered many lectures and taken part in many conventions in this work. He heartily believed in it, and we have no doubt that if he could be consulted, he would rather be remembered for his work for irrigation than for anything else he did in his life. He believed it was a grand work for the solution of many vexing problems. He advocated irrigation because he thought it an opportunity to reclaim vast tracts of land and ultimately furnish homes for millions of the over-crowded population of the world.

PLANT TREES.

What do we plant when we plant the tree?
 We plant the ship which will cross the sea;
 We plant the masts to carry the sails,
 We plant the plank to withstand the gales,
 The keel, the keelston, and beam and knee;
 We plant the ship when we plant the tree.
 What do we plant when we plant the tree?
 We plant the houses for you and me;
 We plant the rafters, the shingles, the floors,
 We plant the studding, the laths, the doors,
 The beams, the siding, all parts that be;
 We plant the house when we plant the tree.
 What do we plant When we plant the tree?
 A thousand things that we dally see;
 We plant the spire that out-towers the crag,
 We plant the staff for our country's flag,
 We plant the shade, from the hot sun free;
 We plant all these things when we plant the tree.

Henry Abbey.

ODDS AND ENDS.

OILING THE ROADS.

Some time ago we gave an item concerning the possibilities of crude oil as a means for preventing dusty streets. At that time the subject was in the experimental stages, but in a recent number of the California *Citrograph* we learn that it has been so favorably received in the vicinity of Redlands, Cal. that the contractor has more than he can do. The trustees of Redlands have, therefore, determined that the city shall purchase a machine, erect the necessary tanks and do its own road oiling. Oil will be pumped direct from the car to the higher tank and thence run by gravity into the heating tank. Work of oiling will begin on July 5th and go ahead at the rate of a mile to a mile and a half a day, a width of 18 to 24 feet. It is suggested that parties refrain from driving over the oiled portion of streets for a few days after the oil is applied, thus giving it an opportunity to get thoroughly incorporated with the road surface so it will not stick to tires or be thrown on clothing.

After all, to be a queen in this age of liberty and enlightenment is not a position that has much authority, especially is this true of England's Queen. The day of the "divine right of kings," together with the star chamber and other abuses, is past, and it is really surprising to learn, from a London newspaper, the number of things Queen Victoria can *not* do. For instance, while she can recall any subject from abroad, she cannot compel a subject to leave his country, even in time of war. She cannot communicate with her subjects nor can she receive presents from her people except through officers of state or through friends personally known to her. She cannot spend

any of the public money without the consent of parliament, nor has she any power over taxation, or the increase of fees for any office. The law assumes that "the queen can do no wrong," therefore she cannot be arrested, and neither can she arrest a person suspected of crime, for should the person prove to be innocent, he would have no redress, as the queen could not be arrested for false imprisonment. The Queen is exceedingly wealthy, for though good and great she has one fault that seems very incompatible with our idea of queenliness—that of parsimony. This, so report says, is the secret of her vast wealth.

During her long reign she has, by her thrift and prudence, amassed a great fortune. Some of her friends, who know her weakness in this direction, give her money, instead of presents. But while ready to receive valuable presents, she is said to be very chary of giving them.

From all of which we learn, that while the Queen may be very rich and hold an exalted position, there are many, many things that even she cannot do.

WITH THE EXCHANGES.

THE AMERICAN REVIEW OF REVIEWS.

The August issue has not yet reached us as we go to press, so we shall have to content ourselves with a mention of the leading articles in the July number. John Barrett, late minister from this country to Siam, writes on "Some Phases of the Philippine Situation," in which he gives his impressions of the islands, based upon an acquaintance with them at the beginning over five years ago, before any trouble had occurred between this country and Spain. His opinions are therefore not only free from prejudice but are based upon an acquaintance with the people in their normal state, and the account he gives of them is full of interest.

Rosa Bonheur, the famous artist, and

her work is another article which merits mention. In connection with it are given pictures of the artist herself.

Under the title of "Brick Paving in the Middle West," Mr. H. Foster Bain, assistant state geologist of Iowa, tells of the improvements already made and to be made in the sanitary and physical conditions of small towns throughout the country, especially with reference to the paving of the streets. Brick pavements for the country towns receive very favorable mention.

McCLURE'S MAGAZINE.

McCLURE'S MAGAZINE for August, with its special cover designed by Will H. Low, its profusion of beautiful pictures, its half dozen excellent stories, and its other interesting contributions, is a number to allure one out of any degree of mid-summer indifference. It has an illustrated article on "The Cape to Cairo Railway" by W. T. Stead, whose acquaintance with Cecil Rhodes and other promoters of the enterprise has yielded him much new and valuable information regarding it. Miss Tarbell contributes a new account of Lincoln's assassination and death, illustrated with the last life portrait of Lincoln and other pictures. But the number is especially a "Midsummer Fiction Number," and its more particular excellence lies in its short stories. These are of a most varied character, comprising a dramatic story of the courts; a humorous story of Irish life; a thrilling true story of the United States Secret Service; a pathetic and tender love story; a kindly, human story of the circus clown of early days; and a breezy, amusing racing story.

THE LADIES HOME JOURNAL.

Hamlin Garland, Anthony Hope, John Kendrick Bangs, Harold Richard Vynne, Anna Robson Brown, "Josiah Allen's Wife," Clara Morris, Kate Whiting Patch and Anna Farquhar are among the half-score of writers of fiction who contribute stories to the August *Ladies' Home Journal*. The Midsummer Fiction Number of the *Journal* is in many respects a notable magazine. It has brought together in a single issue some of the most popular story-writers, and the most capable black-and-white artists to illustrate their work. Fiction, of course, predominates, but there is an abundance of timely, practical articles especially appealing to home and family interests and tending to lighten and brighten women's work.

The first installment of "Josiah Allen's Wife" (Marietta Holley) new story, "My Stylish Cousin's Daughter," is given in this number and is full of promise.

THE FORUM

The most sensible treatment of the servant girl question we have yet seen is that given it by Mary Roberts Smith in her article "Domestic Service."

If we are truthful we will admit that, in the small cities and larger towns at least, to be a "hired girl" is considered degrading. Disguise it and deny it as we will, there is still this fact, that domestic service has a certain stigma attached to it, and this is one of the things that prevents women from taking up this branch of work in preference to the less lucrative and even more arduous ones of clerk, dressmaker, etc. The writer gives as the reason of this attitude of the public toward domestics, the fact that they have no fixed hours of labor, they are more under the supervision of their mistresses, and are treated well or ill as the caprices of the latter dictate, having no fixed rules as in business life. This is due, says the writer, to the liking of human nature to command its inferiors. "Women, especially do not want intelligent equals to serve them: they want an inferior, a subordinate—a servant, not an employe. Compare the attitude of the business man toward an employee, and the mistress towards the servant." This is the keynote to the whole problem. This splendid article should be read by every woman who hires help.

Other topics discussed are:—"The Civil Service and the Merit System," by Hon. Lyman J. Gage; "Liquid Air and Motive Power" by Edwin H. Hall, "Recent Developments in China;" "Have We Sufficient Gold in Circulation," etc.

OTHER EXCHANGES.

We are in receipt of a beautiful booklet published by the Oregon Short Line, entitled "Where Geysers Gush." The illustrations, in colors, show the views that may be seen from a trip over the Short Line Railroad.

The *State's Duty* for August contains among other things—"Better Highways a Necessity" being a plea for good roads by Maurice O. Eldridge, of the U. S. Dept. of Agriculture, "The hopeful Twins," refers to good roads and rural free delivery.





THE MAIN IRRIGATION CANAL IN YELLOWSTONE PARK.

THE IRRIGATION AGE.

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NO. 12.

THE PROGRESS OF WESTERN AMERICA.

**Irrigation
Congress,**

Missoula, Montana., has been selected as the place for to hold the eighth annual session of the National Irrigation Congress, and it is confidently expected by those best calculated to know, that this will be the most interesting and most largely attended Congress ever held. The work done in Congress and elsewhere by earnest workers for the irrigation movement has not been without result. Heretofore these conventions have been attended by scientists, engineers and men directly interested in irrigation, but this year, it is expected that business men and manufacturers all over the country will be represented, as this class is slowly realizing that the opening up for settlement of many million acres through the aid of irrigation means a direct gain to them as well as to the people living in the arid sections. It means to the manufacturer a larger and more wealthy class of people to whom to sell goods. Chairman I. D. O'Donnell, manager of the Minnesota and Montana Land and Improvement Co., when interviewed regarding the coming meeting said that the prospects for the number and influence of the delegates were very promising. While eastern people are not what may be termed enthusiastic over the congress, still Mr. O'Donnell said "it would surprise you to see some of the letters I have received even from Wall street men, who are popularly supposed to use water only in connection with stocks." As one writer aptly puts it "irrigation is becoming recognized as an "issue" in politics, the same as other vital questions."

Eastern delegates who go over the Northern Pacific road will not only pass

through the famous Yellowstone Valley, but will also gain much in an educational way from seeing the great irrigation systems in operation, the miles of ditches, and incidentally may be led to do some "tall thinking" after witnessing the vast amount of water which, instead of being stored in reservoirs for future needs, is making its way to the Missouri and Mississippi rivers, to aid them in their disastrous floods in the South.

Montana is very proud to have secured the convention and will do her utmost to make her visitors welcome. The convention will be held Sept. 25, 26 and 27. The secretary of the congress announces that delegates and others attending the meeting at Missoula may buy tickets to Missoula and return, Sept. 19, on all lines west of Chicago and St. Louis, and possibly farther east, at one fare plus \$2. This concession is not made to the delegates alone, but is for a home-seekers' excursion. As these tickets have stop-over privileges, those taking advantage of this rate will have an opportunity to see something of Montana.

**Everything
has its
Uses.**

Reports from the Board of Charities of Indiana as to the hospital for the insane at Evansville, Ind., show that the hospital has found a way to dispose of sewage to advantage. The sewage is disposed of by chemical process and the solid portion is pressed into cakes and used for fertilizing. The liquid portion runs over a gravel bank which so effectually purifies it that it comes out perfectly clear and odorless and is pumped into a tank to be used for irrigation purposes. Thus the sewage is

gotten rid of in a healthful manner and water to irrigate the growing crops is provided. It is estimated that fully a thousand bushels of sweet potatoes will be raised this year in addition to the Irish potatoes. This would seem to be a good method of disposing of the sewage of all public institutions, such as prisons, reform schools, etc.

Study Of Forestry.

"The exhibit at the Paris Exposition will be largely pictorial because we are so limited in space, says Dr. Bean, the Director in charge of the United States Display. The display will include illustrations of the relation of forestry to agriculture, specimens of the commercial woods in the form of lumber, their sections showing the cell structure, and articles of woodenware. There are three divisions of forestry as it is practiced in America. First the growth of the timber for its own value; second for purposes of shelter, and third, as a help to irrigation.

"The National Paper Co., the largest holders of forest lands in the United States, is the only company that has taken up the study and application of forestry on a large scale. This company has employed skilled foresters with a view to making its lands produce the most timber in a given time, and its cutting of timber is governed by this principle. Special attention is being paid to spruce, as it is the pulp from this tree which is used largely in the manufacture of paper.

Irrigation is largely dependent upon forest preservations. The mammoth forests cause the snow to melt slowly and supply the water in such manner that it can be stored. Their destruction would result in a rapid melting of the snow, producing great floods.

Harvest Time.

This is harvest time in more senses than one. The farmer reaps the results of his spring planting—results more abundant than usual—and everywhere throughout the land is a harvest time for workingmen. Not for years has there been such a demand for labor of all descriptions. In the Northwest farmers complain that they cannot get help enough to harvest their bountiful crops. Truly the "harvest is white

but the laborers are few." In the south, in Alabama and other iron districts foundries are taking orders for pig iron to be delivered the latter part of 1900, and find it almost impossible to keep up with present orders due in a great measure to the fact that help is so hard to secure. Structural steel is also in great demand and within the past three months building materials of all kinds, labor, etc., has so advanced in price as to increase the buildings cost at least one-third. Not only in foundries, factories and in the country districts is the demand for the workmen so noticeable, but also in the city. A year ago the "situations wanted" in the daily papers far exceeded the "help wanted." If you advertised for printers, stenographers, clerks, book keepers a year ago, you found an army waiting in answer to the advertisement. Now, if you have five or ten applicants to choose from you are in luck.

The Great Salt Lake.

It is prophesied that before another century passes away the Great Salt Lake will be a thing of the past. In a year, it is claimed the lake has receded a mile. The cause for this is said to be the excessive drain made upon it by the irrigation enterprises of the Mormons. Contrary to the theory which was accepted for a time, this great lake is not fed by underground springs but by the Jordan, Weber, Ogden and Bear rivers, and when the water of these streams is intercepted for irrigation purposes, it necessarily decreases the water supply of Salt Lake, leaving it more to the mercy of the sun and the attendant evaporation which is constantly going on and which is slowly but surely drawing the water away until in time only a bed of dry salt will remain. The cause of the saltiness of the water of this mysterious body of water has been a matter of conjecture to scientists for years, the most plausible theory is that the saltiness is due to the high altitude which causes excessive evaporation, while there is practically no outlet to the lake. A scientist, after a number of experiments, has expressed the conviction that if all the salt supply in the entire world were cut off except that found in the bed of the Great Salt Lake there would still be enough to

last the world for ages, so deep is this deposit. Regarding the decadence of the lake a writer recently said:

"When the Great Salt Lake is gone it will be missed as a wonder and as a salt factory; for little else. Its waters destroy vegetation instead of nourishing it. Should the fresh waters of Utah Lake, however, be evaporated or disappear into the earth thousands of square miles would cease to be habitable. Some years ago the Utah Lake region was made a government reservation, an act which has kept irrigation companies from drawing water either directly from it or from its feeders. In itself it has become a mighty reservoir, the Jordan performing the functions of a canal in carrying its Eden-making flow through the valley. From the proximity of snow-capped mountains it would seem that mountain streams would furnish all the water necessary for irrigation. The snow, however, does not melt until the season of crop-planting is past, and when the freshets come down they frequently do more damage than good. The average of snowfall, too, is less upon the Wahsatch Mountains than upon either the Colorado or Wyoming ranges."

A Good Step.

An Indiana paper has taken a very progressive step in offering small money prizes for short articles on practical irrigation. Not irrigation out of books, but the real article tested and used by farmers. The paper wants to learn of their methods and experience and the answers received and published each week are very good.

Under Woman's Rule.

In the year that she has reigned over Holland Queen Wilhelmina has done more to rouse the country to new endeavors in every department of art and labor than perhaps any other sovereign has done. She has stimulated the army by her presence at reviews and has increased the pay so as to make it more of an inducement for young men to enter it. Her mother's words, spoken at the young queen's ascension to the throne have been more than verified. "I have no hesitation," said she "in giving my daughter her kingdom, for I know her to be a wise, good woman. She will rule the kingdom

her fathers well and will make Holland great in all things in which a small country can become great. With the wisdom of mature years this young girl queen has had the welfare of Holland at heart and is a model queen and woman.

Fails to Overflow.

For centuries the river Nile has brought down from the highlands of Abyssian and central Africa its freight of fertile soil on which the people of Egypt depend for existence. It has irrigated, cleaned and fertilized the land. The annual rise of the Nile is watched for with the keenest anxiety by the Egyptian powers. Occasionally the flood is so low that it leaves a vast territory uninundated, which is the great calamity this year. It means poverty to many struggling fellow-men and bankruptcy to others. It will no doubt be a stimulant to the proposed dam that is to be built and may quicken its completion.

An Eastern Experiment.

Eastern mill owners and manufacturers have set a good example for western farmers to follow, in their construction of the great Indian Lake reservoir. This reservoir, which was recently inspected by the proper state authorities and accepted as a part of the state's canal system was built by the mill owners of the upper Hudson, with the consent and aid of the state, to increase the summer flow of the Hudson. After the construction of the reservoir the state became responsible for the maintenance of it and for its control. The reservoir has a capacity of 5,000,000-000 cubic feet and the supply of water for the Champlain canal and the Hudson river beginning at Troy, will be decidedly increased, while the mill owners of that section have provided for an unfailing water supply. By this means the cost of manufacture is reduced and the plants are kept busy through the summer. New York has already taken active measures to preserve her forests and they will add materially in this water storage, preventing the rains to run away in disastrous floods. Reservoirs are needed throughout the West and if they could be built by some such method as this it would be a blessing for the arid West.

**A Trip
to the
Northwest.**

During the past month Secretary of Agriculture, James Wilson, passed through Chicago from a trip in the Northwest, taken in the interest of his department. Most of his time was spent in Washington, Oregon and California. He started experiments in grass-growing in the Walla Walla and Yakima valleys with a view to finding a grass which would flourish in the unirrigable grazing districts. Tea culture in the United States is also a subject of experiment, 14,000 young plants having been distributed in the warmer parts and especially in southern California. After reviewing the report of S. A. Knapp, who was sent to the orient to look into the advisability of establishing agencies for American farm and dairy

produce, Secretary Wilson said that he thought that the agricultural condition in the Philippines were about the same as in Louisiana.

**Justice
in
France.**

The Dreyfus trial, the greatest farce in the name of justice that has been witnessed in this day and age, still drags on, and no one is wise enough to prophesy correctly how it will end. One thing is certain; even though Dreyfus be guilty his imprisonment on Devil's island was more than sufficient punishment for the vilest of crimes. The true tale of his sufferings and torture while there reads like an account of the Medieval days and is a disgraceful affair all the way through. But France must have excitement of some kind.



CAMP IN THE NATURAL FORESTS

RECLAMATION OF ARID AMERICA.

ADDRESS DELIVERED BEFORE THE CHICAGO
FEDERATION OF LABOR.

BX GEO. H. MAXWELL.

Mr. President and Delegates and Members of the Federation.—I thank you for this opportunity of bringing to your attention the policy advocated by The National Irrigation Association for the reclamation and settlement of the vast territory known as Arid America. Our association urges that it shall be administered and reclaimed for the benefit of the whole people, and preserved for those who will build homes on the land; and we want your strong and earnest co-operation and support in a united effort to bring about the inauguration of such a national policy.

I believe that as you think about it, the conviction will grow stronger and stronger upon you that there is no problem now confronting the American people which has a closer or more fundamental relation to the welfare of the great multitude of our citizens whose industry is their capital, than the problem of the preservation and reclamation for the people and for the homebuilder of the arid public domain.

The public domain comprises over 500,000,000 acres of land, of which 100,000,000 acres could be reclaimed by irrigation.

Every one will concede that the land question lies at the root of the labor problem, but there are very few who realize that one-third of the entire area of the United States, exclusive of Alaska, is public land and still belongs to the people; and that by the building of great storage reservoirs and irrigation works to reclaim the irrigable lands, the arid region could be made to sustain a greater population than inhabits the whole United States to-day.

No man need argue that these great irrigation works should be by private capital or that the reclamation of Arid America should be left to individual or corporate enterprise. It has been tried and has failed. It is as impossible as that private capital should have built the vast irrigation systems of India or the great dam now being built by the Egyptian Government across the Nile.

The arid region can be reclaimed and settled in only one way, and that is for the State and National governments to build the irrigation works and open the lands up for settlement at a price within the reach

of any industrious man. Men who want work should be given a chance to labor in the construction of the irrigation works, and then a chance to get a home on the land their labor has reclaimed.

We are passing through a period of prosperity when there is work for all who want it. But hard times are sure to come again when men will be thrown out of employment. Labor-saving machinery is constantly lessening the need of human labor. Our wage-earning population is increasing at an enormous rate. Year by year occupation must be found for the new workers who are growing to youth and manhood.

Labor organizations have worked wonders in dignifying labor and maintaining fair wages. But they can not create work where there is none. They should use all their influence to open a channel through which all surplus labor can constantly return to the land, and Arid America beckons to them with open arms to tell them that she can give this opportunity to millions of workers, not only of this generation but of generations yet unborn, if the people will only preserve their birthright and adopt a national policy which will open up that great Western territory to the some class of men who settled the Central Prairie States—men who had something better than money—men who had strength and courage and tireless energy and ceaseless industry, and with them conquered a wilderness and created the great commonwealths and cities and millions of rural homes that now stand as monuments to their labor.

When I stood on the top of the Masonic Temple a few days ago, the spot where old Fort Dearborn once stood was pointed out to me. The thought came into my mind that my mother, who still lives, had in her girlhood days lived in that old Fort, and that this great interior prairie region had been settled, and that this modern marvel—the great City of Chicago—had been created by the labor of man within the lifetime and memory of those who are now living. I was impressed as I never have been before by the giant possibilities which the great arid region still farther to the west holds for the workers of this generation. They can open the gateway to it themselves if they but choose to do so. They have the key in their own hands.

See how simple the proposition is. Year after year, every year we are wasting five million dollars which might be realized from leasing the public grazing lands. If this great sum were saved, by leasing these lands, under the plan advocated by the National Irrigation Association, and expended in the construction of irrigation works, an enormous area of irrigable lands could be annually reclaimed. It would be reclaimed without the creation of a dollar of debt, without the issue of a single bond, without the government parting with any interest in the land, and when reclaimed the land could be sold to actual settlers only, in small tracts, at a price so low as to bring an irrigated farm within easy reach of any industrious wage-earner.

Then the ownership of such a farm would entitle him to go out on the range and lease for a nominal rental of from one to five cents an acre per year, his proportion of the public grazing lands, enough for his needs, to which he would have the exclusive right of possession. With this, and a few sheep or cattle, he would be well started on the road to independence and eventual wealth.

As yet, the people who would avail themselves of these opportunities were they once brought within their reach, have no conception of the possibilities of an independent competence which they would offer to every industrious man. These opportunities would be brought within reach of all, if this policy were once adopted, of leasing the public grazing lands and using the revenues to build irrigation works to reclaim the irrigable arid lands so as to open them up for settlement by actual settlers and householders.

The multitude who would want these homes, and who would avail themselves of the chance to get them, would create a steady current of migration from the congested labor centers "Back to the Land," and would relieve all overcrowding of the ranks of the wage-earners. Social unrest and discontent would be avoided, and stable conditions maintained which would benefit both employer and employed. It is a shortsighted man who does not see that there can be no general and permanent prosperity in which both do not share. The workers are in the end the consumers, and they can not be the buyers unless they have the wherewithal to buy.

The reclamation of this great territory in this way would benefit not only those who went West to build homes; it would benefit every Eastern interest—manufacturer, merchant, farmer, and wage-earner—by the tremendous stimulus that it would give to all our national industries. New Western markets, enormous in their extent, for Eastern manufacturers, would make increased opportunities for labor in the factories, and a correspondingly increased demand for the food products of the Eastern farmers to feed the workers of the factories.

But above all and beyond all, the cause is one which should be taken up by the labor organizations of the country, because its inauguration would, like the sword of Alexander, cut the Gordian knot of the labor problem. It would provide something that must be found—a great labor regular, which would absorb all surplus labor, keep the supply always within the demand, and afford a safety valve and a mighty balance wheel for our social engine.

IRRIGATION IN THE YAKIMA VALLEY.

BY JOEL SHOMAKER.

The Yakima Valley is the largest and most important irrigated section of eastern Washington. It consists of a series of valleys extending from the eastern slope of the Cascade Mountains to the Columbia river, a distance of 60 miles or more. The valley proper has an average width of 15 miles, and includes the Yakima Indian reservation. According to official reports this section has more water for irrigation than any similar sized tract in the entire enclosure of Arid America. The water comes from perpetual snow banks in the Cascades, and is carried through the country in rapid flowing streams, among them being the Yakima, and Natchez rivers and their tributaries, Cowiche, Wenaz, Ahtanum, Toppenish and other creeks. The country of Yakima contains 2,500,000 acres of irrigable lands and the Indian reservation area of about 1,400 square miles.

This valley has been settled less than a quarter of a century, the principal location having been made since the completion of the Northern Pacific railroad, which crosses it from east to west. There are at present probably 18,000 inhabitants in the country and a little more than one thousand Indians on their reservation. The city of North Yakima has about one fourth the population and the remainder are located in farming districts at Sunnyside, Mabton, Prosser and along the different streams. There are 60 school houses in the valley, all the leading church organizations are well represented, and the people as a rule are generally prosperous. The reservation has an industrial school of the highest class, and many of the younger Indians are well educated in language and the arts.

Canals are taken from the streams by the gravity system, and the water is conveyed to the farms in open ditches. The famous Sunnyside canal one of the largest in the west, is 62 feet wide, and has a carrying capacity sufficient to irrigate 60,000 acres. Water under this system costs the users one dollar an acre for annual maintenance, and a perpetual right is sold with the land for \$30.00 an acre. In many instances the homesteaders have exchanged one half their entries for water to irrigate the other half. The Prosser Falls canal is one of the important systems, which like a majority of the irrigation enterprises floated a few years ago, has passed through the days of inactivity, and will soon become one of the powers in reclaiming a vast area of land. Corporation canals have suffered from the recent years

of depression but are all coming to the front again, as good propositions.

The several farming districts along the smaller streams have farm co-operative ditches, built by the land owners and controlled by them at little expense. The Union canal, carrying water to many of the farms and orchards near North Yakima is one of the old co-operative ditches, merged into a corporation. Water rentals are made by annual assessments, under the direction of a board, which estimates the probable expense of cleaning ditch and distributing water. The assessment for this season is 25 cents an acre. The Congdon canal is one of the most expensive of the kind ever built in the northwest. It carries a large volume of water around the perpendicular cliffs of the Matchez river, in a box flume mounted on trestlework, and crosses a deep canyon, by dropping into a barrel flume and forcing itself out on the opposite bank, several feet above the canyon bed.

Yakima Valley has a score or more of fine artesian wells, flowing large volumes, which is used upon land that cannot be reached by the gravity canal system. The water holds a temperature of about 60 degrees, which makes the locations suitable for poultry raising, as it may be piped through the houses and made to take the place of fuel in keeping them at a uniform temperature during the winter months. In some of the river bottoms there is a subirrigation from the streams that supplies all the moisture necessary for growing the cereals and alfalfa without the application of surface water. This does not apply to any part of the valley except the lower river bottoms, as the valley in general is very dry, the average rainfall being less than six inches annually. Very little snow falls during the winter, and that is generally taken away in a few days by the warm "Chinook" winds, from the Columbia river canyon.

Irrigation is almost universally performed by the furrow system, the water being applied by running between the rows of trees or cultivated fields. Every water user has an individual ditch from which he takes the water at any time he sees fit, and distributes it upon his crops. No failures ever come from the deficiency of water, but many make the mistake of using too much on certain crops. The soil is of a volcanic formation, except in the river beds, and very productive, if properly irrigated and sufficiently cultivated. There is but little small grain grown in this valley, as much cheaper land can be utilized in the Big Bend and Palause districts north and east, where irrigation is not practiced, and the early spring rains furnish enough moisture to mature wheat and barley, which are grown very extensively.

Alfalfa is the principal farm crop of this section. It yields from 6 to 8 tons from the three annual cuttings, per acre. The hay is baled and shipped to the Puget Sound markets or fed to cattle and sheep on the farms or in the vicinity. The price ranges about \$4.00 per ton in the stack, with fluctuations in the fall and spring. Several home

dairies and creameries are located in the valley, and the cows are fed dry alfalfa, grain and root rations during the winter and pastured in the green fields in the summer and fall months. The growing of hogs on alfalfa has not been generally adopted but those engaged in the business have splendid success. Alfalfa honey meets a ready market and the bee industry is constantly increasing. The alfalfa seed is imported, much of it coming from Utah and Nebraska. Very little fodder has been noticed in any of the fields and that has been burned by using straw or kerosene.

All kinds of fruits grow profusely in this irrigated empire. There are over 4,000 acres planted to the various fruits, and the acreage increases every year. The largest acreage devoted to one fruit crop is in prunes. All varieties are planted but the Italian and French seem to be the best. The fruit is evaporated and shipped to the markets of the world, many thousands of pounds going to Alaska, the Islands of the Pacific and to Europe. As a general rule the prune loses about two thirds in drying, and the prepared product sells at from 3 to 6 cents a pound. This nets the careful grower an average of \$100 an acre. The largest prune grower in this valley reports having sold over \$9,000.00 worth of dried prunes last year from a 40 acre orchard. As his expences did not exceed one half that amount his profits were very satisfactory.

Hop growing is one of the most extensive industries of the Yakima Valley. There are no less than 3,000 acres planted to hops and the estimate of this season's crop is placed at 20,000 bales, which will bring the growers \$500,000 or more. The hops are planted on well drained sandy loam, roots being six feet apart either way. The first year yields no returns and the expense, exclusive of land, is probably \$200 an acre. This comes from the cost of roots, planting, cultivating, putting in trellises, and building a hop house, getting ready for the second year. A house is necessary for every 15 acres, and there are over 150 houses, costing from \$300 to \$500 each, in this valley. Hops are picked by hand and the acreage in the Yakima Valley requires 5,000 pickers for nearly one month. They receive \$1.00 per box of 100 pounds, and a good man can pick two boxes daily. Many Indians from the Yakima and neighboring tribes are employed in this work.

After picking the hops are placed in the dry houses, where they lose about three fourths in shrinkage, when they are put in bales of about 200 pounds each, and shipped. The Yakima hops are sold on all the leading brewing markets, but the majority go to London and European cities. By careful management growers can get their hops on the market for 8 cents a pound, and as the outlook is favorable for 15 cents or more this season, the hop men are rejoicing. In this valley the hot summer days and the drying winds destroy the aphid or hop-

louse, before the blossoms appear, thus saving the expense of spraying with insecticides, and insuring perfect specimens. There is no rain during the hop picking season and the hops are put in the dry houses in good condition, with no mold or mildew. A hop yard stands several years if properly worked and the owners net more per acre than any other crop in the west.

Truck farming has become a prominent agricultural industry and the era of small farms has been inaugurated. Melons produce wonderful crops which are sold on the markets of Puget Sound. Green corn, tomatoes, onions and similar products are grown extensively, but the demand far exceeds the supply. Strawberries pay handsome profits one man has harvested about 400 crates from a little less than an acre, this year, the prices averaging \$1.50 per crate, or \$600.00 an acre. Winter apples are shipped as far as England, where they command good prices. The orchardists received an average of 75 cents per bushel box at home this spring. The Northern Pacific railway company co-operates with the growers in giving exceptionally low rates for shipping out the products of the soil, hence those who produce what the market demands are always assured remunerative figures for their labor.

The horticulturists of Yakima Valley are learning the lessons of intensive soil culture, and the consumers of their products have seen the many benefits of scientific irrigation. Fruits grown by irrigation possess a distinctive flavor and deliciousness which gives them the preference when placed in competition with the rainbelt products. The man who thoroughly understands the art of irrigating, which must be obtained by reading irrigation literature and constant personal experience, can control the growth and development of his fruits. He has the sunshine and soil at his disposal and is the master of the moisture giving elements. The trees and vines are watered when the demands of nature are made known, and the results are perfect specimens, natural flavor and superior quality.

AMERICAN DATES.

AN ATTRACTIVE INDUSTRY—THE PALM OF THE ANCIENTS LIKELY TO BECOME PLENTIFUL IN OUR SOUTHWEST—IRRIGATION ESSENTIAL.

The United States mails are sometimes used for rather curious purposes. A number of years ago several wagons drove up to the post-office at Washington, D. C., and deposited a number of large tubs containing handsome palms. Having delivered themselves of their freight, the wagons drove off. The post-office people went out to see what the performance meant, and found to their surprise that these palms were to be sent through the mails. The local superintendant at first said that the office would not send them. It was preposterous, he maintained to mail such things. Each tub, full of moist earth and a good sized palm, was as much as two men could handle and on account of the foliage they could not be packed to any advantage. Nevertheless, there were the tags on the tubs, containing the "frank" of the Department of Agriculture and the proper addresses—Las Cruces, New Mexico; Phoenix and Puma, Arizona; Romona, Tulare, etc., California—and the only thing for the Washington post-office officials to do was to mail them. So this was done, although it necessitated special arrangements to care for and water the palms. Thus practically commenced date growing in the United States.

Of these trees, about 40 are now living and thriving, 15 of them having blossomed. Only 7 of these, however, are pistillate or fruit-bearing trees. Since this first attempt at American date culture, the Agricultural Department has followed up the question, and Secretary Wilson during the past year, has had an expert in Algeria, Mr. Swingle, making a thorough study of this subject and sending home plants. The Secretary proposes to spend perhaps \$10,000, during the next two years, of the money allotted him by Congress, for the introduction of useful foreign plants. The dates now being secured in Algeria and Morocco are of the very finest kinds and are shipped in tubs, the same as was done in the original importation. Secretary Wilson states it as his belief that another American industry will result from this experiment, as he believes that dates will thrive as well in Arizona as in Arabia.

The regions in which the date palm reaches perfection, are characterized by deficiency of rain and a wide variation of temperature. The summer heat is intense, 115 degrees or more, though in winter

the temperature may fall as low as 16 degrees above zero. Although the date palm requires intense heat in summer, it will withstand in winter a temperature that would be fatal to the fig or the orange. These climatic conditions are practically identical with those that obtain in the more southern portions of the Great Colorado Desert. So great is the similarity, in fact, Mr. Wilson says, that so far as climate is concerned, we may reasonably expect the date palm to fruit satisfactorily in the arid regions of the southwest. The experiments carried on through the Department show that probably the soil best adapted to the date palm is the one containing a small percentage of clay, fairly free from humus, and charged with alkali. Irrigation and heat are all important conditions. Water is indispensable. The roots should be moist at all times. An old Arabian proverb says that

"The Date must have its head in fire and its roots in the water."

The water used may advantageously be quite warm and contain alkali. Dates may, however, be planted along streams, or by springs or flood basins, and in such situations will grow well; adding much to the landscape by their graceful pinnate foliage. The future of the date industry in the United States, however, depends upon irrigation, and upon irrigation which will not fail in the dryest seasons. Irrigation in the Sahara has greatly increased the date areas of Africa and the conditions are so similar in our own Southwest under artificial watering that the success of the industry there seems assured.

Varieties of dates are almost innumerable. They differ greatly in their color, size, sweetness, delicacy of flavor and length of time required to mature. The dates of commerce are usually light colored, these being better shippers. The male and female flowers of the palm are borne on different plants, the females only bearing the fruit. The blossoming period is a long one, usually about six weeks, but is always late, thus escaping spring frosts. The average yield of a tree is eight bunches, each weighing about 17 pounds, although a bunch may weigh as much as 40 pounds. In Arizona, under irrigation, seedling trees, seven years old, have produced upwards of 200 pounds in a single season.

THE WATER WHEEL.

THE EVOLUTION OF THE AMERICAN TYPE OF WATER WHEELS.

The inquiry as to water wheels, recently received from Turkey, has led to the question. "How do American water-wheels differ from those of other countries?" The answer to this is found in the *Journal of the Western Society of Engineers*, April, 1898, where the subject is treated exhaustively by W. W. Tyler. He says: "The peculiarity of American water-wheels is that they receive water on the periphery and discharge it downward and toward the center, while the foreign wheels receive the water on the top and discharge it below, or at the center and discharge it outward."

¶ Mr. Tyler gives the following history of American water-wheels, portions of which we are obliged to omit, as we have not the cuts with which to illustrate it:

"Nearly all wheels now built in America are mounted in a wooden flume, in iron or wooden penstocks. The water is carried by a flume to the penstock in which the wheel rests. The wheel covers a hole cut in the floor. The water flows through the wheel from the penstock and thereby imparts motion to it. Below the wheel and penstock is a large channel through which the water escapes.

This type of wheel, which is peculiarly American, has been slowly evolved from very imperfect forms until it has become superior to all others. The history of the American turbine is an illustration of American ingenuity combined with that unfaltering faith which does not hesitate to spend hundreds of thousands of dollars in developing inventions.

In the year 1859 the committee of water-works of the city of Philadelphia instituted a series of competitive tests of water-wheels to enable them to select the best design for new pumping works which were about to be erected in Fairmount Park, on the Schuylkill River. The results of those tests were afterwards published in a pamphlet which gives the general condition and state of the art at that time. The Jonval, or French type, gave by far the best results. This wheel led those tests with a high record of 87.77 per cent. efficiency. The wheel which showed the next best record, and which afterwards received the contract and was adopted by the city, was of essentially the same description.

Seven wheels of the class which takes water on the outside and

is now universally adopted by American builders, were tried at the same tests. Their average efficiency was 12.5 per cent. less than those of the Jonval type, and in selecting water-wheels for the city the committee would not consider them because their efficiency was so low. This shows how completely in its infancy was the American type of water-wheel in 1859.

In 1876, seventeen years later, another competitive test of water-wheels was carried on in Philadelphia at Fairmount Park. This test was under the auspices of the Centennial Exposition. Sixteen water-wheels were tried. Fifteen were of the American type. The only Jonval wheel, or wheel of foreign type, was entered by the same manufacturers who secured the order which depended on the tests of 1859. Their wheel was designed by the same French engineer, who had been trained in the best French schools, where he had studied the best French models. Its chutes and buckets were set in finished grooves, cut with perfect accuracy. They were made of rolled brass, so as to allow the water the smoothest and best course.

The American wheel which led the test in 1876 was a Risdon wheel, a plain iron casting. It was from 5 to 10 per cent. better at full gate and gave 33 per cent. more power out of the water at part gate, so much had the American type of wheel been developed at that time.

From 1859 to 1876 a corresponding change had been going on among our large New England factories. There, in 1859, the French Fourneyron turbine had crowded out the old pitch-back breast wheels and had obtained high records.

After 1876 the American type of wheel almost completely controlled the New England trade. The Fourneyron wheel was expensive to build, it clogged easily, it was not efficient at the part gate, and it ran too slowly. Now as to the origin and history of this great change. Until 1850 there was lacking a simple water-wheel which could be used on large streams where the water in the tail-race rises in every storm, and destroys the efficiency of a breast or overshot wheel. This was especially true of saw-mills. They were used only in winter and spring, when the supply of water was ample and it was not necessary to economize it. At first the flutter-wheel was used, consisting only of a wheel with a set of square blades, against which a sheet of water impinged and gave force. They only gave an efficiency of about 30 per cent., but that was enough. The flutter-wheel would not run in back-water and every storm stopped the mill. This led to the adoption of the reaction wheel

The model has two such wheels placed on opposite ends of the same shaft. The water there is let into the flume between them in such a way that it can only escape through the water-wheels.

Passing through the curved vanes of such a wheel, even if it had no stationary chutes or guides, would give the water a whirling motion.

This throwing of the water in one direction would, by its reaction, force the wheel in an opposite direction, just as the shooting of a cannon throws the cannon in the opposite direction to that in which the ball flies. Each of these wheels was in principle a cannon throwing an infinite number of balls, and was moved itself by an infinite number of reactions. In the model of the Andrews & Kalbach wheel the water was let into the wheels by chutes or scrolls, but in actual practice the chutes were rarely used.

The first great improvement made in the reaction wheel was in the addition of the scrolls or chutes. It is said that this invention was due to an accident. A firm by the name of Parker Brothers was engaged in the lumber business and cut its logs with an old-fashioned up-and-down saw driven by a pair of wheels, but without stationary guides. One day a plank fell into the open flume and was carried toward the water-wheel until the lower end caught in such a position as to perform the work of a stationary guide. The influence of this single plank was enough to produce a perceptible increase in the power. Mr. Parker was quick to detect it, and from it developed the scroll. The scroll consisted of a single spiral chute which wrapped entirely around the runner and carried the water into every part of the periphery of the wheel. It made the water-wheel, which he proceeded to manufacture and sell, the best and most successful in the market. He obtained a patent on his wheel, but was unable to control the scroll.

The scroll wheel is an exclusively American type of wheel. The Tyler wheel is a good illustration of one of the best that was made forty years ago. The Ridgway wheel shows almost the only one that is manufactured now. From 1850 to 1860 nine-tenths of the patents on water-wheels issued by the United States government were issued on scroll wheels, and the majority of water-wheels in use at that time were of that description. The runners in both of these wheels were much like those of the Risdon wheel.

The scroll wheel at the present time is considered antiquated, but it was condemned and abandoned, not on account of any fault which was inherent in the principle, but because the wheels were not properly constructed. The writer ventures the prediction that the scroll case will at some future time supersede the tub-shaped case for wheels with chutes, which is adopted by all modern builders. It is more correct in theory, and experiments have shown that with wheels of medium size the water can run through the feeder of a scroll case with four times the velocity that it can run through the feeder of the ordinary case, and there will be no greater loss in power or efficiency.

The water-wheel builder prior to 1860 never understood the wheel that he was building. He supposed that the water ran through the chutes with the full velocity due the fall and impinged against the periphery of the runners, which he knew ran with about six-tenths

the velocity due the fall, when the water really ran through the scroll with only about 45 per cent. of the velocity due to the fall, and the wheel was running about one-third faster than the water that drove it. He did not understand the formula

$$V^2=2gh.$$

but he had a table calculated by that formula which he called the spouting velocity of water, and supposed that under a given head water always spouted at exactly that velocity, when, in reality, it never did. But, in spite of their wrong theories, some very good wheels were developed previous to 1860.

The advantage of the scroll was that it could be built at a small expense out of wood, and the runner could be made from iron at any country foundry. Its fault was that the pressure on all sides of the runner was not the same, forcing the runner to one side and making it bind against the case. This caused a loss of power and destroyed the case. The next great improvement was to place the wheel in the middle of a large penstock and to lead the water to the runner by a series of chutes. This gave to us the American type of wheel of the present time.

One of the men who best represents this period is James Leffel, of Springfield, Ohio, the patentee of the "Leffel" wheel. He was an ingenious mechanic of limited education, who owned a small machine shop, and became interested in the manufacture of water-wheels. His theories were wrong. He believed that the water ran through the stationary guides against the buckets and at first imparted what he called a direct action to the wheel, although in reality the wheel was running 50 per cent. faster than the water, a fact which he never discovered. He then thought that the water was caught by the runner and thrown backwards in a way that imparted a reactionary force, when in reality the wheel was driven by this last force alone. The real principle of all pressure turbines was then unknown. This principle may be briefly stated as follows: The water flows through the stationary guides with the velocity due to one-half of the fall and under the pressure due to the other half of the fall; it enters without blow or shock to the runner, whose speed at the center of the bucket is the same as that of the entering water, when the pressure of the last half of the fall forces the water back and drives the wheel from its reaction alone. This principle seems to have been unknown to early builders of the American type of water-wheel. But ignorance of this law did not prevent the success of James Leffel. He had a miniature testing flume for testing wheels 10 inches in diameter. It had glass sides through which he could see just how the water flowed. He had a Prony brake and diminutive weir by which he learned the power and capacity of his wheel. He experimented upon small wheels 10 inches in diameter until he had one which he considered perfect, and then he had the good sense to stick to it and

not be diverted from it. He made every size exactly similar to that 10-inch wheel upon which his experiments were made. He had always the same number of guides and the same number of buckets. The center of each curve was at exactly the same place, and the radius of the curve was exactly proportional to the diameter of the water-wheel.

The capacity of each pattern was just one-third more than that of the pattern which was next below it in size. His $26\frac{1}{2}$ in. wheel was of just twice the diameter of the $13\frac{1}{4}$ in. wheel, and the $6\frac{5}{8}$ in. wheel was of just one-half its diameter, and so there was an accuracy of proportion which was before unknown. If some of the designers of our modern types of wheels, which are constructed on very complicated principles, had more of the common sense of James Leffel and made fewer changes, there would be fewer disappointments. Even the number of buckets in our wheels of to-day can not be changed without altering the distribution of water in the draft-tube and the percentage of the wheel. James Leffel, like few others, died when his work was done. He left his well-developed invention in the hands of able men, who appreciated it and knew how to sell water-wheels, and the profits from it have exceeded \$2,000,000.

The greatest work done by James Leffel was the introduction of the short-draft tube carrying the bridge-tree which supports the step and shaft, he being the first to make use of this. It prepared the way for the water-wheels of increased power and capacity which are exclusively used at the present time. In these the draft-tube performs the function of the Boyden diffuser and saves the momentum and power that remains in the water after it has passed through the wheel. Experiments recently tried by the writer on the same wheel, first with and afterwards without a draft-tube, showed a difference in power of 15 per cent. in favor of the draft-tube."

WEALTH IN ARID LANDS.

POSSIBILITY OF TRANSFORMING IT INTO FARMS CONSIDERED.

What is to be the future of the more than 10,000,000 acres of unoccupied government lands in Nebraska, probably the most important remaining portion of the public domain? Will the herds of the ranchmen continue to hold their ground on the vast undulating plateaus of so-called arid land, or will the soil be claimed through irrigation for more profitable use, as it was once seized for domestic herds by the slaughtering of hundreds of thousands of buffalo?

These questions are forcing themselves forward for answer, even as the dark green of the corn fields is crowding back the lighter green of the native grasses, where the farmers are sending their plows and planters farther and farther up the steps by which the plateaus rise and recede from the river valleys.

The attempts of capitalists from outside of the State to secure control of large tracts of the land now used for grazing by making entries on them under the provisions of the reservoir act, though rendered futile later by the rules with which the operation of that law has been hedged about, have set the ranchmen of Nebraska to thinking. It did more than that when the news of the first filings under that law spread among them. It sent them hustling on long horseback journeys over the plains to the land offices of the respective districts in which they keep their herds, to protect their own interests by making enteries, each on his own grazing land—his own in the sense that his herds occupy it, and by the unwritten law of the ranchman he holds it by virtue of that fact, so long as they continue to occupy it.

Under the rules governing the application of the reservoir act the ranchman is safe from any encroachment. But he knows there is another law more powerful than any statute enacted by State or federal legislative assembly—that inexorable law of the commercial world which declares that any industry that avails itself of vast natural resources must give way and relinquish its hold on those resources if it shall be found that another industry can use them to greater profit and the greater blessing to humanity.

BENEFIT OF IRRIGATION.

Though the purposes of investment agents and speculators who came from all over the United States to make entries on Nebraska lands never may be clearly known, since the rules promulgated by

Land Commissioner Binger Herman have prevented them from carrying out those purposes, reports have gained currency throughout Nebraska, and some of them based on more than rumor, that it was the intention of at least part of these men to make extensive experiments in the way of irrigating tracts of so-called arid lands and inviting immigrants to occupy them as homesteads, hoping for profit through leasing irrigation privileges to the expected agriculturists.

Despite these rumors the ranchmen would feel no alarm for the future tenancy of their lands were it not for the fact that they know there is scope for the operation of that other unwritten law—the commercial law of the survival of the fittest. They know better perhaps than any one else that the lands on which their herds find none too fat picking need only water to make them among the richest farming lands of the country. There are possibilities, therefore, in the case of the agriculturist as against the ranchman, and until every means that can be devised by human wit to supply the one thing needed has been tried and found unavailing for that purpose, the question will remain as it is today, an open question.

This is why with feverish haste the stock raisers of the State left their grazing herds two and three months ago and made straight for the doors of the government land offices in the grazing district to head off, if possible, a threatened invasion of homesteaders.

The situation makes a study of the map of Nebraska interesting. Where are the grazing lands? Where are the land offices? In what parts of the State are new towns to spring up and elevators to rise over the sites of forsaken cattle pens, in case any one of the various irrigation schemes shall be found feasible? In what directions will new railroad branches be built, and change in that regard the map of the State?

HIDDEN WEALTH FOR FARMERS.

All these things hinge on the prospect of a solution of the problem of giving dynamic character to the potential energy of wealth buried in the chalk-like hills of the now arid district of the State. There are hidden gold mines for the farmer in these Nebraska hills, as truly as for the miner in any of the placer diggings, and he needs only the same requisite to make their wealth available—water.

Broken Bow, the county seat of Custer County and the seat of a government land office, marks practically the geographical center of the State of Nebraska. North and west of it herds that number hundreds of thousands are grazing. Southwest, south and east of it the cornfields and grainfields lie in a mosaic of dark green and gold.

Between Broken Bow and the northwest corner of the State is Alliance. Almost due north of Broken Bow is Valentine. At these points are two more government land offices. That these three places marking an almost equilateral triangle, are the centers of the sections.

of the State where the question is most important can be seen by noting the areas of unoccupied land in each of the land office districts of the State, as reported by the general land office at the close of the fiscal year ended June 30, 1898. The figures follow:

Land office.	Vacant land, • acres.	Land office.	Vacant land, acres.
Alliance.....	2,478,798	O'Neill	764,295
Broken Bow.....	2,678,630	Sidney.....	763,620
Lincoln.....	19,131	Valentine	2,838,988
McCook	208,978		
North Platte.....	796,010	Total State.....	10,548,450

South of Broken Bow the North Platte River stretches across the State. North of Broken Bow is the middle Loup River. Still north of that, and following closely the north boundary of the commonwealth, is the Niobrara River. In their lower courses in the eastern part of the State they flow through the broad valleys in which lie the fertile fields that make Nebraska corn famous the world over. Further west they flow for the most part through tortuous gorges which they have cut in the high and undulating plateaus—the grazing lands which may again become disputed ground between the cowboy and the plowman.

CHARACTER OF THE SOIL.

In their geological formation and in the character of their soil, these plateaus—these gold mines in the potential—are of unusual interest. The soil has been likened to the alluvial deposits in the valley of the Nile, where Egypt's silent and mysterious stream each year overflows its banks and spreads over the land a silt that has been transformed into the finest powder by the action of the water in carrying it down from the river's unknown sources.

Certain it is that the soil of the Nebraska plains is unrivaled in the fineness of its texture. Pick up a bunch of dust in any road and it is found impalpable as fine wheat flour. There is no grit or granular substance in it. Break off a lump of baked earth from the scarred face of the hillside, where the streams have plowed gullies during the last rain-storm, and, on crumbling it, the same fine dust is left. Nowhere is there a stone or grain of sand.

But there is yet something that relieves the sameness of this fine dust and that tells also the story of past ages when these plains that now hold their faces to the sky and cry out for rain were buried under fathoms of water. Even from the sides of stark, bare mounds, that rise in some places a hundred feet above the level of the surrounding plains, one can pick shells that have been imbedded, no one knows how long, in the soil.

These, the ranchmen and land agents say, reveal the secret of the richness of the soil, that needs only a breath laden with a memory of the ocean it has lost to bring waves of green and gold where once were rolling waves of blue.

This section is picturesque as well as interesting. Despite its barrenness, it has a beauty peculiarly its own of which the charm is irresistible. Advancing on the plateaus and away from any of the lower river valleys, one can see ahead always a low range of hills that cut off the sky with a wavy line. Ten, fifteen, perhaps twenty miles away, lie these hills. Once they have been reached and mounted, beyond and still in the same direction, another range appears.

This scene is repeated as step by step one climbs the ranges, traverses the plateaus, and goes on to more ranges and more plateaus beyond. As they recede from the valleys the ranges grow more bare of vegetation, and are traversed with gorges ever deeper, plowed through them by the rain that when it falls comes in torrents.

From a distance and in the bright sunshine the sides of these hills look like the chalk cliffs of England that gave the island its old name of Albion. Close at hand the soil is of a pale, yellowish gray. With the gleam of the sun on it and at a distance it is of dazzling cream color.

But the greatest beauties of this region are accessible only to those who reach the higher levels of the plateaus. Then vision is limited only by the power of the eye or the condition of the atmosphere, and the green of the plain, instead of ending with a wavy rim like the edge of a great scalloped dish, melts into the blue of the sky.

SOLUTION OF THE PROBLEM.

Seven acres of this vacant land, approximately, to every man, woman, and child in Nebraska. And what is to become of it?

Already irrigation has begun to solve the problem. Since the constitutionality of Nebraska irrigating laws has been established nearly 1,500 miles of irrigation canals have been completed in the state and more than 1,000,000 acres of land made available for farming purposes. This has been done at a cost of \$1,500,000 in round numbers, but the work has been carried on only in the parts of the state where the problem could be the most easily solved. There remains for determination the question whether irrigation can be effected for the higher plateaus without expense so great as to make it impracticable from a commercial standpoint.

Irrigation districts can be formed under the Nebraska laws in much the same fashion, legally considered, as that in which park districts can be created in Illinois. State irrigation conventions have been held from time to time, and at the latest of these figures were presented showing that perpetual water rights can be secured under the district law at a cost of \$3.50 an acre, which cost, when purchased from private irrigation corporations, \$10 an acre. Hence, when the question of how to irrigate is answered, as to method, the work doubtless will be done largely by the people, organized into irrigation districts, rather than by corporations.

To the question as to method, there is choice between two alternatives for an answer. There are two possible sources of water supply. One is underground. The other is in the streams, the water to be taken for each tract or plateau from a point in the stream where the water level is higher than the surface level of the plateau.

The one means digging deep. The other means carrying irrigating canals through great distances.

As to first cost, there is no comparison. The well, on the other hand, must be supplemented with a windmill or steam pumping plant and with an elevated reservoir the size of a well's capacity to irrigate each tract.

UNDERGROUND FLOW OF WATER.

Professor Barton of the United States Geological Survey has made extensive investigations as to the underground flow through the arid section and has reported it to be so great and so general as to be practically illimitable as a source of supply of water for irrigation purposes.

If it were planned to utilize this vast area in Nebraska for agriculture by perpetually furnishing it water, and all the water it would need, by artificial means, the number of those who scout the idea would be greater even than it is now. But meteorologists are of the opinion that, once the soil is made fertile by an artificial water supply and the work of raising crops well under way throughout a considerable portion of the territory in question, nature will go far toward caring for the water supply then for all time, or so long as the land is kept under cultivation.

The foundation for the opinion is the theory that the plains get no moisture now from the sky, or but little, only because they give none to the sky. The soil in its untilled condition is peculiarly impervious to moisture, and what rain falls runs into the streams at once and is carried away. None is left soaking in the soil to evaporate gradually and fill the air with mists and clouds and to be precipitated again in rain.

With the ground, or a large portion of it, under crops, this condition would be removed. Whatever rain fell it would be retained in the soil until taken up by the air, as by a great sponge, only to fall again.

It is not believed that by this means the need of irrigation could be done away with entirely for this section. The topography of the region does not warrant such a belief. But it is held that by cultivation the soil could be made partly self-supporting as to its need for moisture, and this would greatly reduce the permanent expense of irrigation.

Again, it is said that if the ranchmen take advantage of the opening offered them under the terms of the reservoir law and build reser-

voirs for stock-watering purposes, in order to retain their hold on the grazing lands, as is not unlikely to occur, this will operate much in the same way as cultivation of the land to increase the rainfall of the region.

The rules framed to govern the operation of the law stipulate that for any forty acre tract on which entry is made under the law within two years after filing his application the holder, if he is to retain control of the land, must construct a reservoir of not less than 500,000 gallons capacity; for eighty acres, not less than 1,000,000 gallons, and for 160 acres, not less than 1,500,000 gallons.

The action of the ranchmen in making large numbers of land entries was taken, they admitted when making their entries, to prevent the possibility of outsiders crowding them off their long used ranches by taking advantage of the law. None of these ranchmen, so far as known, has begun the building of reservoirs. The law gives them two years from the date of filing applications in which to complete the work. If in that time the reservoirs are not made according to specifications, the applicant loses his control of the land. Title he does not acquire under this act in any case. But land office officials, ranchmen, and the farmers agree that if the stock-raisers build any great number of reservoirs the result will be eventually toward making the land they thus seek to hold for grazing purposes really that much more available for farming.

It is not believed in Nebraska that any future influx of homesteaders will be marked by such conflicts between them and the ranchmen as were common in that State thirty years ago, the last of which did not occur until ten or twelve years later. There is hardly a country on the boarderland between farming lands and grazing lands, and few even in the strictly agricultural districts of Nebraska, that has not its story of ranchmen killing homesteaders for driving off or killing their cattle, or homesteaders killing ranchmen for trying to drive them away from their farms.

KILLING OF HOMESTEADERS.

The latest occurrence of this kind, and one of the most famous, was the killing of two homesteaders, Mitchell and Ketcham, in Custer County, eighteen miles southwest of Broken Bow, early in the '80s. The homesteaders had been accused of branding for their own the cattle of ranchmen—"slow elk," as cattle were called on the ranges in those days—and of killing cattle and defying arrest for the same.

A deputy sheriff, who for reasons had adopted the name "Bob" Stevens, but whose real name was Olive, went with Ira Olive, Prent Olive, Marion Olive, and others to arrest the two belligerent homesteaders. One of the two, in resisting arrest, shot and killed "Bob" Stevens. The two were arrested then and were to be tried for the murder.

It was then waiting trial and on the way from one county jail to another, ostensibly for their safer keeping, that the two homesteaders were waylaid and lynched. They had been taken first to a county jail to the south. It was argued that they were likely to be attacked there. Tradition has it still that an official who had authority over their movements was in league to turn them over to the ranchmen but, however that may be, the men were started north for lodgement in the Custer County jail at Broken Bow



WILL IRRIGATION PAY THE FARMER?

BY O. H. CURTIS.

The time is quickly coming, or has already come, when the farmer as a class, is no longer called by the balance of humanity, "*a gawk*" "*country gake*" "*hay seed*" or other similar terms.

Why is this change? Both, because the other classes now realize that the farmer is necessarily for their own existence, and that they are not necessarily for his, and also because, by better education personally, the farmer has elevated the standard of his occupation. This has been brought about by the free use of the many inventions which lessen his labor, thus giving him extra time for reading and study, and also by direct study and practice, in many cases, at the various agricultural colleges of the country.

Logically then, this proves that any means which will make the farmer more successful, will enable him to better his condition, and tend to elevate his class in the estimation of people generally. Unquestionably, an increased yield of crops, with little if any added expense or labor by the farmer, will add to his success. This will be the sure result, both from more intense and careful cultivation of the soil, which education teaches him to accomplish, and also from the use of irrigation as an auxiliary aid to his own careful labor. This is amply proved to be a fact, in Nebraska and many other parts of our country.

Near Ord, Neb. a yield of 105 bushels of barley to the acre resulted from irrigation.

Where only 30 bushels per acre of corn was raised on adjoining land, 65 bushels resulted from irrigation.

P. J. Hendryx, of Platt Co. raised 25 acres of celery which netted him above all expenses, \$125.00 per acre.

Another farmer raised 1365 bushels of onions on a single acre. His neighbor raised only 100 bushels without irrigation.

Mr. Sailing of Cozard, from applying water only twice to his wheat, received a yield of 40 bushels per acre.

Adjoining him 20 to 23 bushels were raised without irrigation.

A striking example is shown at Green River, Utah, in the very heart of the barren desert, where three years before, every vestige of civilization was destroyed by fire.

Since then, by the use of the water from one artesian well, has resulted, several trees six inches through and sixty feet high, and in a garden of half an acre or less, all the vegetables are constantly

grown, that are needed for the use of all the people that live there, and also for the railway eating house of the D. & R. G. Ry. In quality they easily excel those shown at the county fairs in the eastern states. Five cuttings of alfalfa result during one season. Over 2,500,000 acres are now reclaimed by irrigation in Nebraska, at a cost less than \$2.20 per acre, resulting in an increased value to the land of over \$10.00 per acre.

This is done by systems which utilize the water of some of the rivers, the state laws governing which, being exceptionally liberal to the farmer.

Besides all this there are some 2,000 private wells with pumps and windmills of various kinds in the western part of the state. This latter means is one within the reach of every individual farmer, and may be utilized by him at small expense, where the waters of some stream are not available.

Windmills and pumps are now in active use in many places, made by each farmer at a low cost.

One near Kearney, six feet high, nine feet long, and three feet wide with eight fans, cost only \$1.50

Another at Lincoln, 9 ft. wide, 13 ft. long and 13 ft. high, cost \$8.00 and irrigates five acres of garden.

The largest "Jumbo" is owned by John Tannahill, a market gardener, near Columbus, Neb., which not only irrigates ten acres of garden, but has made an extensive grove of heavy timber all around his place. A field for the inventor of windmills is awaiting someone. A body of water underlies the whole arid region easily reached by wells.

That it is inexhaustable, is proved at Hutchison, Kan., where from a space of 150x150 ft., 5,000,000 gallons of water are pumped daily from a depth of 40 feet or less, with no seeming effect upon the supply.

One windmill will irrigate six acres, which with intense farming, will easily support a family of five persons.

Added wells and windmills on a farm, will add correspondingly to the profits of the farmer, requiring less labor on his part, than would be necessary, were he depending upon the regular rainfall. This is true everywhere, and wells would enable the farmer to augment the natural rainfall, and in seasons of unusual drought his crops would be insured.

Where one animal can now be fitted for market, at least five could be sold by means of irrigation, with little if any added labor or expense.

Rotation of crops and added fertilizers, maintain the strength of the soil, and by the aid of irrigation, will result in a yield of crop, double if not four fold what the average farmer is now receiving.

GOVERNMENT VERSUS PRIVATE IRRIGATION.

That the government will undertake a complete system of irrigation works, ultimately covering all possible territory, is a policy as sure to be adopted as the sun is sure to rise, the question being simply one of time.

There is no likelihood that the government will ever construct reservoirs where private capital can be enlisted to do the work, but as each year adds to our experience on water problems, we begin to see that these private water schemes are generally too serious a menace to public welfare. No land in the world can afford to pay so high a price for water as the orange orchards of Redlands. One would imagine that capital would have rushed in long ago to pick up the scattered fragments of the Bear Valley Company, to have built dams in the Santa Ana Basin, and to have developed water at other points. A water famine has stared Redlands in the face for years. The extortionate price of \$3, and even \$4, an inch for a day's flow of water has been considered an inevitable sequence to a dry season, and has now become a fact, yet comparatively little has been done to avert the disaster. The loss on the coming crop, already affected by water shortage, is estimated to be far in excess of what the necessary dams would have cost. Why has the project not been taken up by capitalists? Why has Redlands stood like one paralyzed? Simply and solely because progress has been and is today blocked by sympathizers of the Bear Valley Company and the holders of the company's securities. No matter what these securities may be, the owners of them faintly hope that something may ultimately be realized from their interests, and so desire to place no obstacle in the way of a reorganization. The citizens are beginning to realize that their interests are not identical with the security holders of the Bear Valley Company.

Since the failure of the Company, some years ago, the loss to the State along the Bear Valley system cannot be computed at less than one-quarter to one-half million dollars annually, and this is but one of many private schemes which have wretchedly failed, all of which are now bringing discredit upon irrigation development. As George H. Maxwell, an eminent irrigation authority, says:

"Litigation, uncertainty and deception as to water supplies and water rights have created widespread distrust and fear of settlement on irrigated lands. Every western colonist whose hopes have been blasted by any of these causes has warned a whole community in the East to beware of risking a similar disaster by coming West.

“Not only must these evils be absolutely remedied and removed, but it must be made known to all the people that the conditions which gave rise to the evils have been permanently changed, and that the irrigated rural home is safe from drought and litigation. This knowledge must come to the people through the press spontaneously and naturally, as news of conditions actually existing and permanently established in the West.

“These results can only be brought about by the adoption by the State and Federal Governments of a broad policy for the reclamation and settlement of the arid region, the adaptation of the laws of irrigation of every State of this policy, and the application of sound and fundamental principles to the construction and operation of all irrigated systems. The water-right system on one hand, and the irrigation district system on the other, must be eliminated.

“The ownership of land and water under all distributing systems must be united, and the fundamental principle must be recognized that the land itself is worthless unless there is attached to it as a perpetual appurtenance the inalienable right to the water necessary for its irrigation.”

That such an end may be attained through private ownership of water privileges, is, except in rare cases, quite impossible. That the broad government policy would accomplish the desired result is incontrovertibly true:—*The Los Angeles Times*.

THE DIVERSIFIED FARM.

In diversified farming by irrigation lies the salvation of agriculture.

THE AGE wants to brighten the pages of its Diversified Farm department, and with this object in view it requests its readers everywhere to send in photographs and pictures of fields, orchards and farm homes; prize-taking horses, cattle, sheep or hogs. Also sketches or plans of convenient and commodious barns, hen houses, corn cribs, etc. Sketches of labor-saving devices, such as ditch cleaners and watering troughs. A good illustration of a windmill irrigation plant is always interesting. Will you help us to improve the appearance of THE AGE?

FOREST RESERVE REGULATIONS.

J. B. Collins, superintendent of the United States forest reserve in Montana, is in receipt of the following instructions from the commissioner of the general land office:

"Referring to the provisions of the act of June 4, 1897, for free use of timber, as regulated by the rules governing forest reserves, you are advised as follows:

"1. Any person authorized by the said act to procure forest reserve timber for his own individual needs, may procure it through a saw mill operator or other person acting as his agent direct, but however procured, whether by his own hands or an agent direct, he should first confer or communicate with you directly or through the nearest forestry officer, designating the location, amount and value of the timber proposed to be cut, the place where and the purpose for which the said timber will be used; stating what sawmill or other agent, if any, will be employed to do the cutting, removing and sawing; and pledging that no more shall be cut from the reservation than he needs for his own land or claim; and that none shall be sold, disposed of or used on any other than his own land or claim; and guaranteeing to remove and safely dispose of all tops, brush and refuse cutting, beyond danger of fire therefrom.

"2. The bona fide settler and miner, acting in his individual capacity, is not precluded from taking his timber to the saw

mill, nor is the proprietor precluded from receiving and sawing or otherwise handling the timber for that settler or miner; provided the sum charged therefore is exclusive of any charge for the timber itself, and is no more than a reasonable sum to cover time and labor expended, and all legitimate expenses in sawing or handling it. The charge cannot be paid with any part of the timber or with any other timber taken from any public lands.

"3. The stumpage valuation is the value of the timber in the standing tree; and is determined by the locality and size of the timber, the commercial use for which such timber is sought, the demand therefor, etc.

"4. The said provision for the free use of timber contemplates individual use only. Therefore mining corporations, lumber companies and any organization engaged in extensive business enterprises requiring vast amounts of timber are not entitled to any of the benefits hereof.

"5. Residents of towns and villages within or near a forest reservation, having railroad facilities and other convenient access to saw mills and lumber yards, where lumber and fuel can be procured by purchase, are not entitled to the benefits of the provision of the law for the free use of timber."

A GOOD OFFER.

A farmer of Durango County, N. M., an enthusiastic advocate of the beet sugar in-

dustry, offers 160 acres of land to the man who this season makes the best display of beets showing the largest percentage of sugar.

DOES FARMING PAY?

The article on "A Farmer's Balance-Sheet for 1898," which appeared in the *Review of Reviews* for last March, shows the net profits on 8,000 acres of Iowa grain-farming to have been \$50,855.22.

Reuben and Lucien Bradley were born and reared on a Michigan farm. This farm had been cut from the woods by the father, and endless toil had been expended in bringing it to a state of fair productiveness. But even when the boys became of age it produced only a scant living for the family.

The problem of a livelihood and a vocation forced itself upon Reuben and Lucien. They were strong, steady, and industrious. They had graduated from the village school. The father was not able to set them up in business. They knew it and did not complain. He had done the best he could. Reuben was tired of the country. He went to the town and apprenticed himself to a harness-maker. Against the advice of his young friends, Lucien bought sixty acres of land and ran in debt for it.

In a year Reuben was earning a dollar a day. After the day's work he wore a white shirt and collar and pointed shoes, because other people did, not because they were comfortable. He had no debts. Lucien had fair crops, but they yielded little more than enough to pay interest on the mortgage. He wore a ragged shirt and patched breeches and cowhide boots. People said that Reuben was making a gentleman of himself and learning a trade in the bargain.

In two years Reuben had completed his apprenticeship. He was now earning ten dollars a week. He boarded in a house that had a fancy veranda and green blinds. His clothing improved. Lucien was still ragged; but he paid his interest and \$300

on his principal. People said that Reuben was bound to come to the front.

Reuben became foreman of the shop at \$50 a month. He bought a house and lot on the installment plan and paid for it within five years. The country people called upon him and ate dinner when they went to town. Lucien paid off the mortgage and owned the farm. People said that Reuben and Lucien were good citizens.

In ten years more Reuben was still foreman of the shop. He received the same wages. He lived in the same house. He wore the same cut of shirt and same kind of pointed shoes. He smoked Havana cigars. Lucien built a new house and barn. He had a good carriage and driving-horse. He smoked a pipe. The neighbors saw that every year he made some improvement on the farm. The barn was full of tools. He wore a white shirt when he went to town, and he had a pair of button shoes. People said that Lucien was becoming a prominent man; and his word was good at the bank.

Reuben began to complain that harness-making was too confining. His health was breaking down. The proprietor of the shop was selfish and would not die and leave the business to him. Harness-making was not what it used to be. Lucien bought more land. He went fishing when he wanted to. Reuben came out now and then to spend a Sunday. The birds seemed to sing more sweetly than ever before, and the grass was greener. Lucien indorsed Reuben's note.

Lucien has pigs and cows and sheep and chickens and turkeys and horses. He raises potatoes and beans and corn and wheat and garden stuff and fruits. He buys his groceries, tobacco, and clothes. Reuben buys everything. At the close of the year Lucien puts \$100 to \$300 in the bank or he takes a trip to Boston. Reuben does well if he comes out even. Lucien does not fret. Reuben grumbles.

The moral is that the \$200 a-year-income farm is a more important factor in

the national welfare than the \$50,000-income farm is. The one is in the reach of any industrious and intelligent man. The other is in reach of the few. The one is safe and steady. The other is speculative and uncertain. We need the moderate and modest farm to make citizens. We use the other to make money. The large money-making farm is a useful object lesson. It shows that business and executive ability can make money from the land as well as from a salt mine or a bicycle factory. But it is a fallacy to hold it up as the ideal in American farming.

SHEEP AND CATTLE WAR.

Evidences of the inadequacy of the present land laws for the western range, and the necessity for a policy of leasing the now overstocked public grazing lands, continue to present themselves in further reports of conflict between western ranchmen. A Cheyenne dispatch calls attention to northwestern Colorado as the scene of war between sheep and cattle men. Four well armed horsemen, it is stated, carefully disguised, recently shot and killed 150 sheep and crippled 25 more belonging to the Warren Live Stock Company of Cheyenne. It was also reported that two sheep herders were badly beaten. All such dispatches go to show that the range question has become a burning one, and that grazing regulations and leasing of range lands have become a necessity to insure law and order.

VALUABLE FOREIGN SEEDS.

Mr. Jared Smith, one of the grass experts of the Department of Agriculture, states that the Department has received some seeds which may prove interesting to western farmers. They are mostly from the arid regions of Siberia and Russian Turkestan country, in many respects resembling the arid regions of the West. Among them are hairy vetch, which is drought and also cold resistant, a variety

of winter rye which is especially hardy and drought resistant, oats, and two or three kinds of winter wheat. Most of these seeds are thought to be suitable to climates having extremes of temperature, and the Department is willing to supply free trial lots to farmers desiring to try them. Some of the Turkestan alfalfa, which is thought to be very drought resistant, is also available.

THE SMALL FARM BEST.

How much happier would our farmer and his family be if he had not to exceed 160 acres, well fenced, thoroughly cultivated, with comfortable and substantial buildings and improvements of all kinds. With the possible addition of one man, he and his family can do all the labor necessary to keep the farm in good shape and make a comfortable living.

People do not always practice what they preach but Hettie Green, the richest woman in America is an exception to the rule, for she has practiced the advice she gave a little girl as to how to become rich:—

You shouldn't drink coffee. You're too young.

Don't eat candy. I never ate candy when I was a child. I never spent my pennies for it.

Try doing without coffee and putting the pennies you save in that way in the bank.

It doesn't matter if it's only two cents a week.

I had only 50 cents when I started to make money. I put it in the bank.

Be careful of your health.

Be reliable—that's the golden rule of business.

Save your pennies.

Study, not how you can spend the money you have earned, but how you can make more.

Keep on earning money. If you stop earning, your fortune will shrink, just as your arm does when you don't exercise it. See that your head isn't lame. It doesn't matter about your legs.

Learn to know good people from bad.

PULSE OF THE IRRIGATION INDUSTRY.

FORESTS AND RESERVOIRS.

That the preservation of the forests of the arid region is a duty distinctly belonging to the General Government seems to be a general opinion. Large appropriations have been made for the surveys of proposed forest reservations, thousands of square miles of forest land have been reserved, and ways and means for forest preservation are now being discussed and considered. One of the strongest arguments which is advanced showing the importance of forest preservation is the influence which forests are known to have in conserving moisture, the forest acting like a great sponge which takes up rainfall and then allows it to gradually seep away, supplying streams, brooks, and springs.

Inasmuch as the commercial value of these forests is comparatively insignificant, except in furnishing fuel or rough timber, the water question is really the important one. Here, then, we have the Government through its administration of forests, practically spending money to store water and conserve the flow of streams. Why therefore is it not a proper Government function to spend money for building works which shall artificially store water, as the forests do naturally? Undoubtedly the preservation of the forests is a highly important question, and especially in the West, and the Government is the proper agency to insure such preservation, but the principal arguments which can be brought forward in support of the policy, apply with increased force to Government construction of reservoirs.

A STANDING REPROACH.

The National Tribune has the following strong article in relation to irrigation in the

West:—It is a reproach to this age of great engineering feats that every year devouring floods on the Missouri, Arkansas, Red, Colorado, and Rio Grande Rivers devastate the country, and a few months later hundreds of millions of acres lie parched, sterile, and unproductive for lack of the water which has been allowed to run to worse than waste.

With all our advances in other directions, we are far behind the people of 20 centuries ago in our knowledge and application of the science of irrigation. The ancient Egyptians, Assyrians, Jews, Chinese, and even the Peruvians, and whoever were the inhabitants of New Mexico and Arizona, understood and practiced better than we the art of carefully conserving the water that fell during Winter for use on their fields during Summer.

It is true that they had but small areas, but the extent of country that they rendered certainly fertile every year by this means was much larger in proportion to their means than the whole extent that could be fully irrigated by the superabundant waters of the rivers named. With their mechanical and engineering knowledge, with their tools and their limited population and capital, the building of a storage reservoir one square mile in extent, with a canal leading from it for 20 miles, was a bigger proposition than would be to us the storage of all the excess waters of the mighty Missouri, and other distribution over the arid plains of Wyoming, South Dakota, Colorado, Nebraska, and Kansas. If this were done it would furnish farms, homes, food, and livelihood for millions.

There is one enormous advantage that we have over any previous irrigators, and

that is in the abundance and cheapness of iron. This will enable great conduits to be laid to reach any section, instead of being confined to ditches, which must follow the configuration of the ground, or be carried across valleys and ravines by expensive aqueducts. We got a hint of the future in this direction by an order to our iron manufacturers from Australia a year or two ago for 300 miles of iron pipe. That length would carry water from the foothills of the Rockies to almost any point on the plains below.

It is true that the present tendency of iron is upward, but the constant wave is toward cheapening its production by improvements in the methods of manufacture.

Irrigation Congresses have already done much good work in arousing attention to the vast importance of the subject. What is wanted is such public interest in the work as will lift it to the plane of a great National policy, like the Rivers and Harbors, the Seaside Fortifications, the Navy, and the Tariff systems. It is deserving of fully as much interest and agitation as the most important of these. The people on the lower rivers deserve protection from the annual inundations. The home-seekers deserve to have the desert places made fit for habitation, and for their improving labor.

What is immediately needed is the inauguration of a comprehensive National policy of irrigation, which will select the sites of storage basins in the Rocky Mountains and their foothills, and begin their construction. It will be high economy to begin this work at once, while the title to all the lands involved remains in the United States. As soon as any lines of irrigation are decided upon, there will be a rapid settlement of the lands to be benefited, and their improvement will compensate the Government for any outlay.

Senator Warren came near getting a bill through the last Congress to begin this work. It can be done in the coming session if those who see the immense im-

portance of the work will arouse themselves and make their influence felt.

When once the benefits of irrigation are demonstrated, other methods will be employed in addition to the great Government works. There are subterranean rivers in large areas of the arid section. Windmills employed as freely as they are in Holland would bring up enough water to irrigate great tracts. In California they are even bringing in electricity, with every promise of success, to the work. The power is generated by the waterfalls in the mountains, and transmitted by wire to the lowlands, where it will work pumps.

Proper effort will result in the arid and semi-arid regions of the far West being made in the near future to support in assured comfort an immense population.

TO THE DEVELOPMENT OF THE WEST.

The greatest obstacle in the path of storage of water in the West by the Federal Government lies in Eastern opposition among farmers. Many Eastern men cannot be convinced that the development of the West means a sympathetic quickening in the East through increased manufacturing to supply Western communities, which will employ additional labor and cause an increased Eastern demand for farm products.

An official of the Eastern Grange and a member of other farmers' organizations—a man liberal minded on most large questions—said, in discussing the question, that he could not see anything but local benefit to the West to result from irrigation, and as far as Government assistance was concerned he was strongly opposed to it. The whole people should not be taxed to help out a few sparsely settled arid States.

“But how about doing the work through an equitable division of the river and harbor bill appropriations, giving the West some sort of show against the immense annual expenditure in the East under this bill?” was asked.

"No, no: it would be a direct injury to the Eastern farmer. Eastern farmers don't want the opening up of more Western lands."

Upon the suggestion that this was a narrow view—to retard the development of any part of the United States—the reply was made that the people as a whole were not called upon to subsidize the West; let the Western States do their own developing. Moreover, he said, he believed the East particularly the Grange and other farm organizations, would shut down squarely upon such projects when the matter was brought before them as an issue. They only needed to understand it to veto it.

While this dog-in-the-manger policy is not general in the East there are undoubtedly many Easterners who entertain just such narrow views, as was very clearly seen in the fight for national aid along these lines made in the last Congress. The West should not deceive itself in the belief that there will be no Eastern opposition to Government expenditures for storage of water. This fact, then, simply emphasizes the necessity of the utmost harmony of purpose and action by the people of the West in demanding the adoption by the Government of a policy whose enactment means the future life of the Western country. The great arid West is no mere corner of land to be shoved aside and allotted any administration desired by the rest of the country. The West is fast becoming the center of attention from a standpoint of sound financial investment, and no such narrow policy and treatment by the East will be tolerated. Nor is the West powerless, as was forcibly demonstrated in the United States Senate in the closing days of last Congress. It can demand a fair consideration of its claim and a fair adjustment, and it can enforce its demand. But this it can accomplish only through a united effort. If the West speaks as one voice and for one thing, its demand will be heard. If different factions cry for different things it will be easy and plausible

for the Eastern statesman to say to the West: "Why, you come to us with a diversity of demands and we cannot tell what is the real wish of the people of the West: therefore, it is not wise to take any action. But this ready excuse to avoid action is throttled in its inception by a delegation of Western Senators and Congressmen, stating in no uncertain terms that what the whole West wants, each and every State and Territory, is the adoption of a policy by Congress whereby the National Government shall build storage reservoirs and control their waters for the use of settlers, out of general appropriations, which shall thus give to the West its fair share of the public money for internal improvements.

Will the West make this demand? Will its national legislators speak with one voice? Will its people demand of their representatives this fidelity to their cause? It lies with the people.

AN OLD QUESTION.

Ever since the days of the earliest settlers in the far West, the attractive proposition has presented itself of impounding winter waters in canons and keeping it against the dry time of summer, when it could be utilized for growing purposes. Most of such operations in our West must necessarily be on a large scale, owing to the generous hand which nature used in moulding the country, and this accounts for the fact that the practice of constructing these artificial lakes or reservoirs has not been more general. In India, where the formation of the country is different, thousands of small canons have been dammed and little reservoirs formed, which fill during the period of rains and form a water supply for the cultivation of the acres adjacent. India is looked upon as a benighted portion of the globe, but when the great American Southwest shall have progressed as far as has India with the irrigation problem, those of us who are now familiar with her appearance will fail to recognize her then smiling areas, as the West of to-day

WITH OUR EXCHANGES.

REVIEW OF REVIEWS.

One of the leading articles of the September number of this valuable periodical is the one on Col. Robt. G. Ingersoll, by Rev. Wm. Hayes Ward, D. D. Portraits of the great freethinker are given in connection with the text, one showing him with his two grand children, another taken in 1876 at the time when he made his famous speech nominating James G. Blaine and another from a late photo. A picture is also given of the death-mask by the sculptor Geo. Grey Barnard.

John Barrett tells of the "Half Year of War With Aguinaldo," and Hon. Geo. E. Roberts explains "Why Trusts Cannot Control Prices." Another treatment of the trust question is given by Henry Macfarland under the title "Must the 'Trust' be a Presidential Issue?" The same writer discusses our new secretary of War, Elihu Root.

Among the other leading articles that make up this interesting number are two that will appear more directly to "Age" readers, one "The Future Value of the New England Farm," by Hezekiah Butterworth and the other "Does Farming Pay" by Prof. L. H. Bailey.

McCLURE'S MAGAZINE.

McClure's Magazine for September opens with a poem on the Dreyfus affair by Edwin Markham which proves that the mark reached by Mr. Markham in "The Man with the Hoe" was not beyond his reaching again. Following this comes a character sketch of Admiral Sampson, by Ray Stannard Baker. It is illustrated with a series of portraits of Sampson and various other pictures.

Miss Tarbell concludes, in this number, her series of papers on the later life of Lincoln with an account of Lincoln's funeral.

An illustrated paper by Theodore Waters describes the wonderful methods of the Hydrographic Office in "guarding the high

ways of the sea," and gives, from records of the Office, some strange stories of sea storms, derelicts, and icebergs. An illustrated paper by Cleveland Moffett gives a very interesting account of Menelik, the king of Abyssinia, a black man, more or less barbarous in costume and custom, but still eagerly interested in the newest developments of science and invention devoted to the elevation of his people.

There are half a dozen good, strong, interesting stories in the number, including a true story of army life by Capt. J. E. Brady and a true story of railroad life by Cy Warman.

THE FORUM.

The Forum for September is a number of world-wide interest. Mr. William T. Stead, editor "Review of Reviews," gives his views of "The Conference at the Hague;" President Robert E. Jones of Hobart College discusses "Washington's Farewell address and Its Applications;" Mr. Ramon Reyes Lala, a native Filipino, writes entertainingly of "The People of the Philippines;" Prof. Rudolf Eucken of Jena tells of the "Progress of Philosophy in the Nineteenth Century;" Charles Denby, Jr., contributes an article on "Cotton-Spinning at Shanghai;" Sir William H. Rattigan, an eminent jurist of India, portrays "Indian Famines;" and A. Cahan furnishes a review of "The Young Russian Writers."

SCRIBNER'S.

For September contains an article by Lieut. Col. J. D. Miley, on "Secret Societies in the Philippines." Frederic Island describes a 500-mile canoe trip from Mattwa to the head waters of the Ottawa river. Robert Louis Stevenson describes his life in the Adirondacks. Judge Robert Grant closes his series of "Search Light Letters;" Henry Van Dyke has a poem entitled "A Slumber Song for the Fisherman's Child," etc.









